# AUTOMOTIVE INDUSTRIES
## The AUTOMOBILE

Reg. U. S. Pat. Off.
Established 1902

Vol. 63 No. 16

NORMAN G. SHIDLE, Directing Editor

LESLIE PEAT, Managing Editor
P. M. HELDT, Engineering Editor
JOSEPH GESCHELIN, Asse. Eng. Editor
ATHEL F. DENHAM, Field Editor
HAROLD E. HILLMANN, Asst. Editor
HERBERT HOSKING, News Editor
HAROLD M. BAKER, Detroit News Rep.
A. B. CROFOOT, N. Y. News Rep.


## Contents


Future Production Activity Forming in Economic Mold. By K. T. Keller ..... 541

Successful Use of Cemented Carbide Tungsten Demands Careful Study. By Joseph Geschelin 544

Record Attendance Hears Six Papers at S.A.E. Production Meetings in Detroit ..... 550

Unusual Plant Methods Meet Definite Shipping Schedules ..... 554

Just Among Ourselves ..... 559

Improvement in Electroplating Quality Needed to Meet Competition. By Edmund B. Neil... 560

Purchase of Machine Tools Justified on the Basis of Financial Returns. By Ernest F. Du Brul.... 565

Automotive Machine Tool and Equipment Exhibition ..... 567

Machine Tool Review ..... 590

News of the Industry ..... 595

Production Index ..... 599

Calendar of Events ..... 600

Advertisers' Index .....262-263



Automotive Industries is published every Saturday by

CHILTON CLASS JOURNAL COMPANY

Chestnut and 56th Streets, Philadelphia, Pa.

C. A. MUSSELMAN, President and General Manager
J. S. HILDRETH, Vice-Pres. and Director of Sales
W. I. RALPH, Vice-Pres. G. C. BUZBY, Vice-Pres.
A. H. VAUX, Secretary and Treasurer
JOHN A. CLEMENTS, Asst. Treasurer

JULIAN CHASE, Business Manager Automotive Industries
GEO. D. ROBERTS Advertising Manager

Cable Address .....Autoland, Philadelphia
Telephone .....Sherwood 1424

OFFICES

New York—U. P. C. Bldg., 239 W. 39th St., Phone Pennsylvania 0080
Chicago—5 South Wabash Ave., Phone Central 7045
Detroit—710 Stephenson Bldg., Phone Northway 2090
Cleveland—1140 Guardian Bldg., Phone Main 6860
Los Angeles—503 Petroleum Securities Bldg., Phone Westmore 9084

Controlled by United Business Publishers, Inc., 239 West 39th St., New York; ANDREW C. PEARSON, Chairman, Board of Directors; FRITZ J. FRANK, President; C. A. MUSSELMAN, Vice-President; F. C. STEVENS, Treasurer.

SUBSCRIPTION RATES: United States, Mexico, United States Possessions, Canada and all countries in Postal Union, $3.00 per year; Foreign, $6.00 per year. Single Copies 35c.



COPYRIGHT, 1930, CHILTON CLASS JOURNAL COMPANY



Member of the Audit Bureau of Circulations
Member Associated Business Papers, Inc.

Automotive Industries—The Automobile is a consolidation of the Automobile (monthly) and the Motor Review (weekly), May, 1902; Dealer and Repairman (monthly), October, 1903; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918



WYMAN-GORDON AVIATION FORGINGS

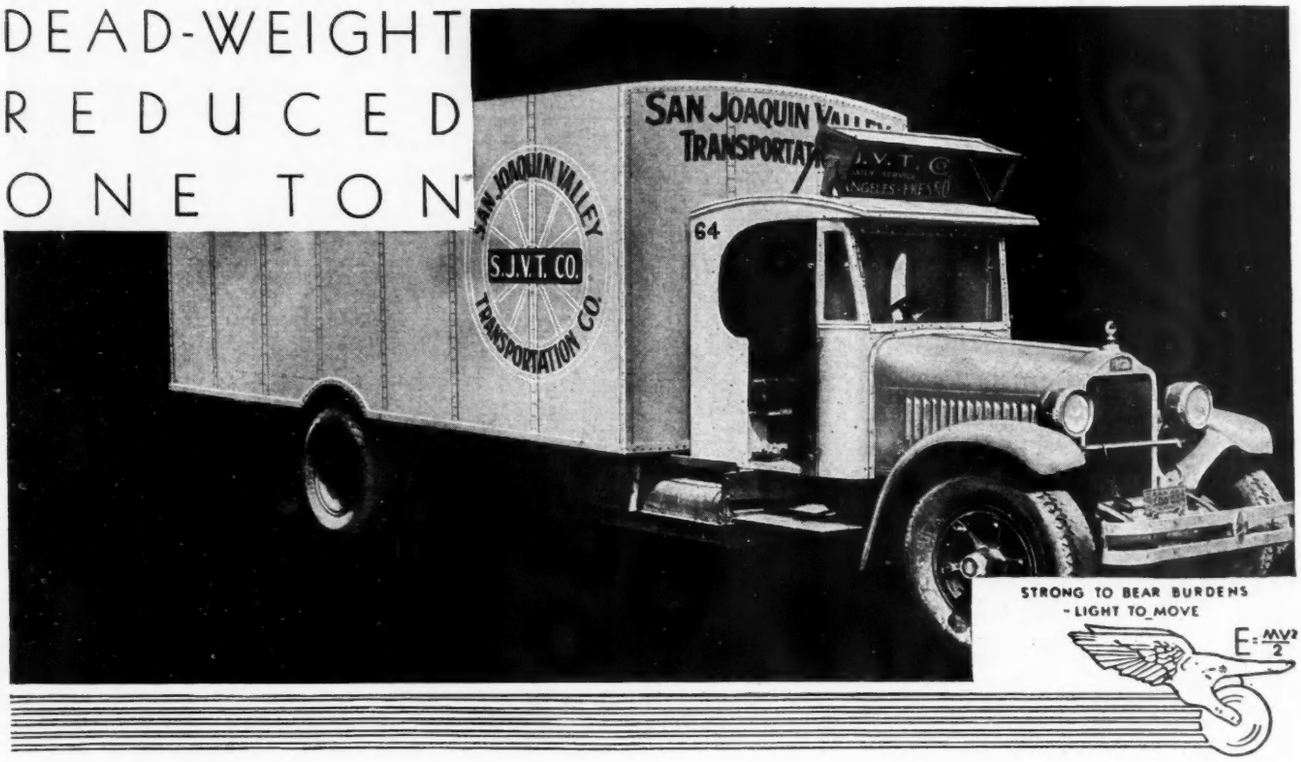
CRANK-SHAFTS
MASTER RODS
LINKRODS
CAMSHAFTS
CAMRINGS
PROPELLOR HUBS
REDUCTION GEARS

ADDRESS the AVIATION DIVISION AT WORCESTER

IN THE AIR TO-DAY AS ON THE HIGHWAYS FOR 30 YEARS

WYMAN-GORDON
WORCESTER MASS.
HARVEY ILL.

# DEAD-WEIGHT REDUCED ONE TON




# Every 10th load hauled free

With the same chassis, suppose one truck manufacturer offers an extra ton pay load with the same gas, oil and tires.

Who gets the order?

This is exactly what is being done with the aid of Alcoa Aluminum strong, light Alloys in body construction which retain strength and reduce as much as ½ the dead-weight.

One of many instances of saving is the San Joaquin Valley Transportation Company. Rebuilding one of their truck bodies which originally had a capacity of 9 tons, eliminated one ton of dead load and converted it to pay load. Traveling an average of 240 miles a day, this meant a free haul of 240 ton miles daily or every 10th trip free.

Where else could money be invested to bring such certain return?

Paint charges may be saved by using Alcoa Aluminum in its natural finish. A high scrap return is another dividend obtained when the equipment has completely depreciated.

Alcoa Aluminum is effecting weight savings not only in bodies but in motors and chassis. Write our nearest office or communicate direct for further particulars. ALUMINUM COMPANY *of* AMERICA; 2410 Oliver Building, PITTSBURGH, PENNSYLVANIA.

ALCOA ALUMINUM

TRADE MARK

# ALCOA ALUMINUM

AUTOMOTIVE INDUSTRIES

VOLUME 63 OCTOBER 18, 1930 NUMBER 16

# Future Production Activity Forming in Economic Mold

By K. T. Keller
Vice-President
and
General Manager
Chrysler Corp.

WHAT are the major problems confronting the production executive today?

Outwardly a list of them would appear but little changed from any similar list which might have been compiled any time within the past decade. True, there would appear some rearrangement of the items as to order of importance, and there are a few additions to the sub-headings in the list. But fundamentally the names of the problems have not changed. The difference lies in the problems themselves, and in the economic changes which make necessary a redefinition of each problem.

To a large extent, the production executive's ability to find the correct

solutions will depend on his appreciation of the economic changes which have been going on around him. The day of "mass production," as we have known it in the past, has gone. That cars will continue to be built in large quantities, possibly larger than we have ever previously known, is evident. Indications are already available that the industry is once more on the upgrade. But the production, year after year, in large quantities of a given automotive vehicle, without material change therein has for the time being, at least, become an impossibility.

## "Over Consumption" Blamed

The conditions which preceded and attended the early part of the sales decline provided further evidence of the changes which the factors controlling the consumption of automobiles have undergone.

What we have suffered from in this country has not been overproduction so much as it has been overconsumption. The desire on the part of the public for the "latest thing" in automobiles, its place as an essential element of normal living, its status as a symbol of personal independence, social distinction, and higher standards of living has brought about what fundamentally amounts to the necessity for continuous improvement in design.

As long as this condition exists, new models will have to be the rule rather than the exception in our industry. Our problem is not to sell the public what we build, but rather to supply the public with what it demands, and only as long as it demands that specific type of product.

What has been said of the attitude of the consuming public toward the automobile is also in a large measure true of the men who help to build these automobiles. Probably the very product he helps to produce has been more responsible than any other element in endowing the workingman with a larger measure of self-respect and desire for personal independence. The American workingman wants to stand on his own feet. He can no longer be driven toward higher effectiveness. The desire must be inherent within him as a result of his understanding that he performs a vital function within his organization. Only cooperation and understanding between management and men can achieve this end.

While a discussion of economic conditions may seem a far cry from the more intimate and individual problems of the production executive, it is these very conditions which must form the basis for the evaluation and solution of his major problems.

Broadly speaking, these can be separated into two major classifications, those of a mechanical nature and those related to personnel, although the two are definitely related. Under "mechanical" would fall such items as types and quantities of machine tools, and small tools; dies, fixtures, etc., the elements involved in tooling up for production; inventory control; material handling and overhead.

The remarkable mechanical progress which has been made within the automotive industry as a result of intensive concentration on the development of new and higher production capacity machine tools, new cutting alloys, material handling methods and better production processes has a tendency sometimes to obscure the definite relation existing between these individual items and economic conditions.

What is needed in the way of machine tools is more automatic machinery, but less special purpose, if by "special purpose" is understood a machine tool designed specifically for the production of a definite type and size of part, and in which a change of design of the part would involve costly alterations in the machine.

Moreover, high production capacity alone in a machine tool does not necessarily produce more efficient operation. Its efficiency when the plant is on partial capacity production must be taken into consideration. In this respect, it has now become the almost universally accepted practice in the more progressive plants of automotive industry to lay out a plant for double-shift operation to correspond with capacity, reducing the working hours with reductions in production requirements in order to reduce labor turnover and layoffs to the minimum.

The outstanding problem in connection with small tools is need for more standardization. The elimination of needless multiplicity can in itself produce considerable reductions in the overall cost of production. An example in point is the standardization work that has been carried out among the plants of the Chrysler Corp. By the standardization of spindles and guards it has been possible to reduce the number of different types and sizes of grinding wheels by approximately 26 per cent during the past year, and indications are that another year will see this figure increased to about 50 per cent.

Such standardization work results not only in a reduction of stock to be carried, thereby reducing the overhead, but also enables a shifting of small tool equipment from a relatively idle plant to a more active plant within the corporation. The extension of such standardization work throughout the automotive industry by cooperation of the various manufacturing companies would react to the mutual benefit of all concerned. The manufacturer of the equipment would benefit by the reduction in variety it is necessary for him to produce and stock. The users would benefit in the same direction, while disposal of excess varieties of one size or type of equipment which proves unnecessary at a time of a design change would be made possible within the manufacturing companies of the industry. Such interchange is now already being conducted on a small scale between a few companies with considerable mutual benefit.

## Tooling Up is Gigantic Problem

When it comes to dies, fixtures, etc., the general problem of tooling up for any particular design, the production executive is probably faced with his largest individual problem. Taking into account the necessity for seasonal fluctuations in production and the impossibility of accurately predicting the period of time during which any new model will continue to meet the public's changing fancy, tooling up must of necessity be endowed with the utmost possible flexibility. No general rules can be laid down in this respect, but it

must be borne in mind that hardly a part of the present-day automobile, aside from bolts, nuts and washers, remains unchanged for much more than a year or so.

Under these conditions the cost of tooling up presents a prodigious problem to any production executive. Machine tool manufacturers could well afford to give increasing attention to flexibility in their products. Tool block mounting plates, for instance, should be slotted to enable a ready shift in tool space. Heads for multiple-drill presses, etc., should be so designed for maximum facility of changeover at the minimum cost.

## Parts Inventories

The problem of inventories of parts is subject to the same conditions as that of tools and equipment. Aside from the obvious reduction in overhead, keeping down of inventories enables changing over production from one model to another with the minimum loss of time.

The subject of inventories inevitably brings to mind the question of how much of the production of an automobile should be carried on within the plants of the merchandising company and how much it would be more economical to have produced by specialized manufacturers. Only one general rule can be laid down in this respect: competitive "bids" must be available for the attaining of the lowest possible production cost. In the case of the small or middle-sized automobile manufacturer, the tendency would naturally be to farm out as much of its work as can consistently be done. At the Chrysler Corp. we found it possible to manufacture most of our major parts due to two factors:

First—The existence of competitive manufacture of similar parts among the various manufacturing companies constituting the corporation, made possible in turn by

Second—Engineering standardization.

The latter is again important in enabling the flowing of volume for any one model into the production facilities of the entire corporation.

In larger companies again, more of the production must be passed on to parts manufacturers. The reason here is that the management of too large a plant becomes cumbersome and top-heavy, and a division of responsibilities becomes imperative for the proper control of manufacturing methods for maximum economy and inventories.

Engineering standardization in the case of the Chrysler Corp. enables an interchange of parts between idle and busy plants in the same manner as was made possible by the standardization of minor production equipment and accessories. In this program the production man has been playing a more and more important part, since it has become increasingly essential that engineering design be of such a nature as to present the minimum of difficulties in tooling up for production, or in changing over existing production equipment. In the Chrysler Corp. it quite frequently happens that changes in design, especially of minor parts, will originate in the production division. The only requirement is that these designs conform with the appearance and performance standards established for them by engineering.

K. T. Keller

Again in the development of new production methods, there is a necessity for consideration of what the public wants in the way of an automobile. A case in point is the growing demand for corrosion resistance. Chrom-plating of metallic exterior parts was the first step. Next in the case of the Chrysler Corp. came the rust - proofing of fenders before lacquering. To this has been added the remainder of the sheet metal. But we are still confronted with the problem of working out a satisfactory method of rust-proofing before laquering the body proper. This will undoubtedly soon be accomplished.

## Personnel Relationships

So much for the mechanical problems confronting the production executive. The second group, closely related to the first, centers around the personnel. In our basic list of problems, the items in this group would probably fall under the major head of labor stabilization, again illustrating the difference in the definition of the problem. To provide the workingman with a steady job, insofar as economic conditions permit, at fair wages, and under safe physical working conditions, is an ideal which every progressive company is endeavoring to live up to. The cost of labor turnover and of accidents alone dictates that such a policy is an essential element of good management.

As offering the greatest possibilities for obtaining active cooperation between men and management, we would probably list the training of minor production executives, the foremen and gang bosses. While there has been much argument as to how, where, by whom, and when a foreman should be trained, it has been generally recognized that the training of the individuals within an industrial organization, particularly foremen, is an important function of management.

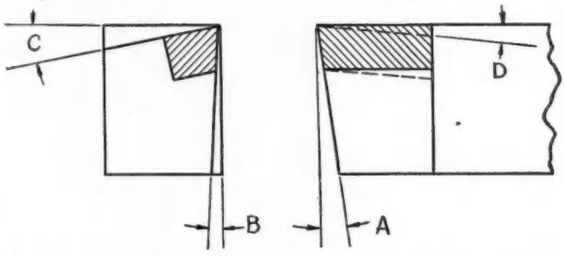
Since the foreman is the essential intermediary between the workingman and management, and the representative of both, an insight into the methods and ideals of the management is a necessary part of a foreman's equipment for the proper handling of his job. Each year calls attention with increasing forcefulness to the fact that better leadership is needed by the executives who are in direct contact with the work-

*(Turn to page 559, please)*

# Successful Use of Cemented Tungsten

By Joseph Geschelin

**Table I—Recommended rakes, angles and clearances for Carboloy Tools**




| | | | |
|---|---|---|---|
| Front clearance angle | "A" | Top side slope | "C" |
| Side clearance angle | "B" | Top back slope | "D" |

**Rakes and Clearance Angles for General Use**

| Material | Front Clearance | Side Clearance | Top Side Slope | Lip Radius |
|---|---|---|---|---|
| Cast Iron ..... | 6° | 4° | 12° | .... |
| Soft Steel ..... | 6° | 6° | 14° | ⅜"—1¼" |
| Medium Steel ..... | 6° | 6° | 14° | ⅜"—1¼" |
| Hard Steel ..... | 4° | 4° | 14° | ⅝"—1" |
| Non-ferrous Metals.. | 6° | 6° | 10°—20° | 4°—14°* |

* Top Back Slope.

For all shaper or planer work, front clearance angle should be 3° and tool should be given a negative top rake of from 3°—5°.

HAVING run the gantlet of the probationary period which precedes the introduction of major advances in the mechanical field, cemented-tungsten-carbide tools definitely enter a new phase which promises a wider extension of their applications. Sensational performance records have been subordinated to the more important manufacturing economies made possible by the introduction of these new tools, as will be evident from the impressive economies effected in many automotive plants as recorded in the technical literature for the past year, much of which is noted in the bibliography at the end of this article.

Profiting by the successful applications as well as some of the failures, enough has been learned about the behavior and characteristics of cemented-tungsten-carbide tools to enable the tool engineer to select those applications that might be reasonably expected to be successful and to predict economies to a large degree of accuracy. These conclusions are reached by the writer after an intensive study in automotive plants and after consulting with many of the tool engineers who have been so instrumental in this development. And it is the object of this article to discuss in some detail the extent of knowledge concerning applications, tool forms, aspects of the grinding problem, and manufacturing economies.

Since the first question which arises in considering these new tools concerns the most likely applications, let us consider some of these. To begin with, the most decided economies have been made on many almost commonplace operations of turning, planing and milling. The record shows that successful applications may be safely expected of the general run of non-ferrous materials and metals, cast iron, and malleable iron.

Cemented-tungsten-carbide tools have given signal service on specific jobs such as turning and grooving pistons of aluminum and aluminum alloys. Moreover, they have proved to be life-savers on certain spectacular jobs where no other cutting tool could have served as well, if at all. Notable among the latter are the following few: (a) salvage machining of hard castings; (b) intermittent cuts; (c) milling, planing and turning through hard scale on cast iron; (d) production setup on special materials such as Lo-Ex pistons at the Reo Motor Car Co. plant.

In the early stages, the production man, intrigued by the possibilities of this new cutting tool, penalized it by confining applications to spectacular machining problems. However, the pendulum has swung definitely the other way since the economy records of the past year point so unmistakably to the potential savings on many routine production jobs. Among the latest and most practical applications are cast iron flywheels, cast iron and malleable iron brake drums and the milling of crankcase, cylinder block and manifold faces.

From the point of view of management, the major justification for the use of cemented-tungsten-carbide tools is that of economy in overall manufacturing costs. But, since economy has been stressed and covered so thoroughly in the technical literature of the last year, it is hardly necessary for us to add very much to this store of information. In this connection we might point specifically to the economy studies in recent issues of Carboloy, the report of the A.S.M.E. Special Research Committee on the cutting of metals, and other articles noted in the bibliography.

A major economy and one which probably has not been given sufficient emphasis is the opportunity of reducing the scrap pile by decreasing the finish-allowance on castings. The ability of cemented-tungsten-

# Carbide Demands Careful Study

**A competent tool engineer must select the operations likely to give immediate economies**

**Grinding should be centralized and a careful operator selected who has proper equipment + + +**

carbide tools to cut through hard scale and sand with facility makes this an immediate possibility.

Adding to the record, we give below some figures which probably have not been printed elsewhere. Among these is the following excerpt from the report of the tool engineer to the management at the Timken-Detroit Axle Co. "We expect to make an average labor saving of 15 per cent on each drum by using this metal for cutting. As the drums are coming now, we will have to double our present piece-work prices in order to enable the operators to make our base rate if we continue to use high speed steel. This recommendation refers to the turning with cemented-tungsten-carbide on all gun iron drums and all cast steel drums."

Here are a few reports submitted by the tool engineer at Studebaker showing in a brief, convincing manner, economies in grinding cost, tool cost, and increased production resulting from judicious applications of cemented-tungsten-carbide tools.

"Turning, straddle facing and grooving camshaft front bearing. This was done in three operations on LeBlond lathes using high-speed-steel tools.

"*Operation 1*—Rough turn and rough straddle face. *Operation 2*—Finish turn and finish straddle face. *Operation 3*—Cut oil groove.

"These operations were run by one operator, and he was only producing an average of 30 pieces per hour with the machines running at a speed of 90 F.P.M. *Operation 1* used three . . . . tools which cost approximately $2.00 and would produce an average of 20 pieces per grind at a grinding cost of approximately 35 cents for 270 pieces, and the life of the tools was good for 2000 pieces. *Operation 2* used three tool bits and the tool cost was the same, grinding cost was a third and life of tools was good for 6000 pieces. *Operation 3* used tools which cost 75 cents, but would only produce from two to eight pieces per grind and the grinding cost is nine cents on this kind of tool. The life of this tool is only about 500 pieces.

"These same operations are now run on one machine using cemented-tungsten-carbide tool bits and running at a speed of 195 F.P.M. and runs an average of 500 pieces per grind and will produce 50 pieces per hour, an increase of 66 per cent in production. For 2000 pieces:

| | |
|---|---|
| A set of . . . . tools cost | $ 5.00 |
| Grinding cost | 12.00 |
| Total | $17.00 |
| A set of cemented-tungsten-carbide tools cost | $73.50 |
| Grinding cost | .64 |
| Total | $74.14 |

"These tools have now run better than 3000 pieces and have been ground away less than 1/16 which will make them good for better than 30,000 pieces at a cost of about $85.00.

**Table II—Recommended clearance and tool angles for Widia tools**

| Material to be Machined | Clearance Angle $\alpha \pm 1°$ | Tool Angle $\beta$ |
|---|---|---|
| Soft Steel | 4° | 60-65° |
| Hard Steel | 4° | 65-74° |
| 12% Manganese Steel | 4° | 80-84° |
| Stainless Steel | 4° | 65-74° |
| Chilled Cast Iron | 3° | 82-86° |
| Soft Steel Castings | 4° | 68-73° |
| Hard Steel Castings | 4° | 73-78° |
| Grey Cast Iron | 4° | 74-80° |
| Bronze, Brass, Etc. | 6° | 65-75° |
| Aluminum Alloys | 8° | 50-55° |
| Planer Tools—As above but with Negative Back Rake 12°-15° | | |

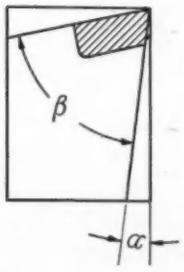


**Table III—Grinding recommendation by the Firth-Sterling Steel Co. + + + + + + + +**

## Grinding Wheels

### Abrasive Co.

Roughing: Grain 60 to 80, Grade I or J
Finishing: Grain 80 to 120, Grade H (according to size of tool)
Stoning: Grain 60, Grade H
Lapping: Grain FF

### Carborundum Co.

Roughing: 60 Grit—N to R grades. W-G Bond
Finishing: 120 Grit—P to T grades. W-G Bond
Stoning or Honing: No. 292—4 x 1 x ½. Carborundum Machinists' Stone
Lapping: On cast iron or wood disks at 500-1000 S. F. P. M.
Finishing compound R40 fine
Peripheral speed 4000 to 5000 S. F. P. M.

### Norton Co.

Roughing, freehand: Crystolon Grain 60/1, Grade I
Finishing, freehand: Crystolon Grain 100/2, Grade I
Roughing, machine: Crystolon Grain 760/1, Grade I
Finishing, machine: Crystolon Grain 100/2, Grade H or I
Honing—Grain 280 grade N and O

### Precision Grinding Wheel Co., Inc.

Roughing: Grain 36, Grade L or M Lo-Tens Vitrified
Finishing: Grain 60, Grade I and Grain 80, Grade I Lo-Tens Vitrified

". . . . tools would cost better than $200.00 for the same number of pieces. This has also eliminated one part time operator, as there used to be four men on this line and it is now done with three."

### Finish Boring Flywheel Housing in Motor Assembly

"This operation is done with a special Star feed head and was using a . . . . boring tool running approximately 150 F.P.M. and would produce from 10 to 15 pieces per grind. Considerable trouble is had with this job due to runout which was from 0.005 to 0.008 in.

| | |
|---|---|
| Tool cost for 500 pieces is | $0.38 |
| Grinding cost for 500 pieces is | 1.50 |
| Total cost of 500 pieces | $1.88 |

"Carboloy is now on this job and will produce 500 pieces per grind, and it has also cut down the runout to 0.003 to 0.004 in. and increased production 5 per cent.

| | |
|---|---|
| Tool cost for 500 pieces is | $1.00 |
| Grinding cost for 500 pieces is | .15 |
| Total cost for 500 pieces | $1.15 |

### Rough and Finish Boring and Facing Flywheel Housing

"This operation is done on two Gisholt lathes and is running at a speed of 125 F.P.M. On the boring operation two . . . . tools were used, one for roughing and one for finishing and the same thing on facing.

"The roughing tools were only good for 5 to 7 pieces per grind while the finishing tools were able to produce 60 to 80 pieces per grind.

"Carboloy tools were placed on the roughing operation only and will produce 250 pieces per grind. The high-speed-steel finishing tools will do the same thing because by using cemented-tungsten-carbide, less stock is left for finishing. The speed of the machines has not been increased because they were running too fast for . . . . tools and just about right for cemented-tungsten-carbide. If the speed is increased it will cut down the life of the tools and will also be too fast for the rest of the operations. As it is, they are able to produce about ten pieces more per day per machine and the rest of the operations are coming better, due to not so much runout.

Per 100 pieces:

| | |
|---|---|
| Tool grinding cost for running 100 pieces using . . . . tools is | $0.90 |
| . . . . tool cost | .75 |
| | $1.65 |

Per 100 pieces:

| | |
|---|---|
| Tool grinding cost for running 100 pieces using cemented-tungsten-carbide tools is | $0.20 |
| . . . . tool cost | .75 |
| | $0.95 |

"This is a saving of 60 cents per 100 pieces. Cemented-tungsten-carbide tools are good for approximately 6000 pieces at a cost of $69.00 for the tools and the grinding.

"The cost to run 6000 pieces using . . . . tools is approximately $99.00 for the tools and grinding."

Considering the extent of the applications of cemented-tungsten-carbide tools and the significant savings achieved in certain directions, it is hardly likely that any production man will overlook the possibilities of adapting these tools to the problems in this plant. But what of the factors essential to the success of cemented tungsten carbide tool installations? Personal observation of the organization existing in plants where tool applications have been so successful, and in those where failure has occurred, provides interesting and decidedly practical information bearing directly on this problem. A definite procedure predicated upon slight changes in tool organizations is indicated. Indeed, it is a surprisingly simple matter to handle, as will be evidenced by the following, and yet absolutely essential to the success of the introduction of cemented-tungsten-carbide tooling.

The first essential is to assign to a competent tool engineer the responsibility for these tool applications throughout the plant. He must familiarize himself with the usually successful applications, and the specific design and applications of tooling. Other functions of this tool engineer will be to select applications most likely to give immediate economies in his plant and to maintain cost records on each tooled job.

Beyond a doubt, the mental inertia of the machine operator is the most serious obstacle to successful application of cemented-tungsten-carbide tools. And one of the most important jobs of the tool engineer

is to train the operator and sell him the idea of giving the new tools a fair and reasonable trial. In most cases it has been found advisable to stand by each job closely to make sure that the operator does give it a fair trial.

Grinding, which will be considered in more detail later, is another primary consideration. The grinding of cemented-tungsten-carbide tools is so important and so essential to the maintenance of initial performance that all grinding should be centralized in the tool room, or the tool crib, as the case may be. A careful operator must be selected and trained and provided with the proper grinding equipment. All cemented-tungsten-carbide tools in the plant should be routed to this operator whenever grinding or dressing is required. In all probability many failures may be attributed to handling by the machine operator or some other person unschooled in the proper procedure in handling and grinding cemented-tungsten-carbide tools.

Tool engineers are convinced that this setup is sound, logical and quite essential. In this connection we quote the recommendation contained in the interesting report of the Timken tool engineer which was mentioned earlier.

"We do not believe that we should at the present time promiscuously put cemented-tungsten-carbide on all jobs in the shop, but do think that if we set up the higher production jobs and make the proper changes in our machines and tool holders, we will considerably increase our production on these jobs and, for the time being, I think that the supervision of the handling of these tools should be under this department so that we will be able to accumulate the necessary records to economically use this cutting metal."

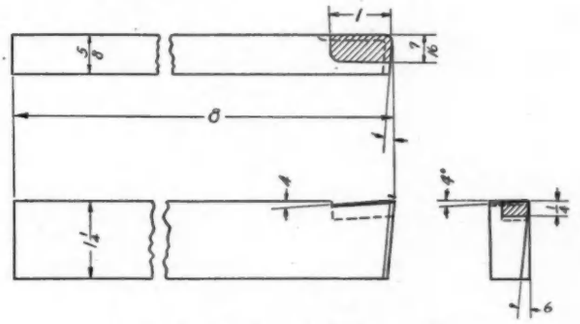
Much has been said about machine tools and their condition in connection with the application of these tools. Unquestionably, a good deal depends upon the design of the machine as well as its condition. In fact, many applications which failed would probably be successful if the operation had been performed on suitable equipment. An interesting turn of events, perhaps wholly unexpected at the outset, is the fact that the new tooling may be profitably used with the existing machine tool equipment. Indeed, these new tools have shown the production man the way to maximum utilization of his machine tool equipment and have revealed excess capacity of which he was probably unaware. In many cases this has been responsible for an increase in production per day per machine and, in some recorded instances, has cut down the number of machines required to handle the same amount of production as previously. Another effect of this will be to produce a better power factor in the machine shop, and this may be an additional source of economy not now evident on the surface.

Certain applications now classed as failures will probably require new machines specifically designed for the service demanded by cemented-tungsten-carbide tooling. And, where quantity warrants it, these machines undoubtedly will be provided.

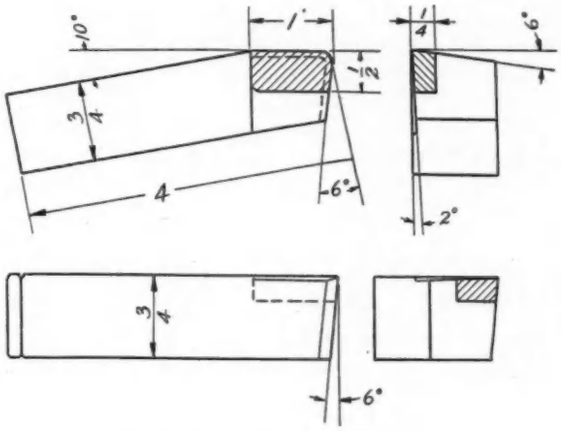
Shop grinding, concerned with the maintenance of the original tool form, is a problem of consequence which really controls the success or failure of these tool applications. Manufacturers of cemented-tungsten-carbide tools, as well as writers in current technical literature, all stress the importance of correct grinding.

The first requirement is adequate grinding equipment. Grinders should be rugged, preferably capable of high spindle speeds and free from vibration.

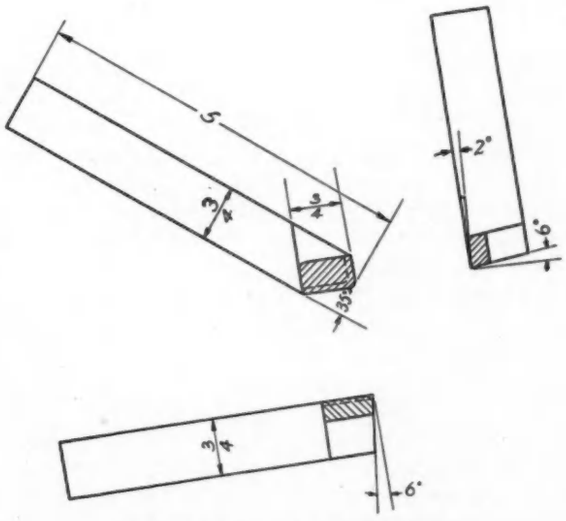
**Group of tools used by the Timken-Detroit Axle Co.**



Facing tool for hub flanges

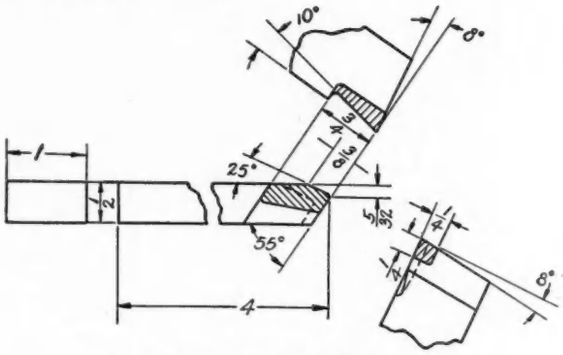


Turning tool for hub flanges

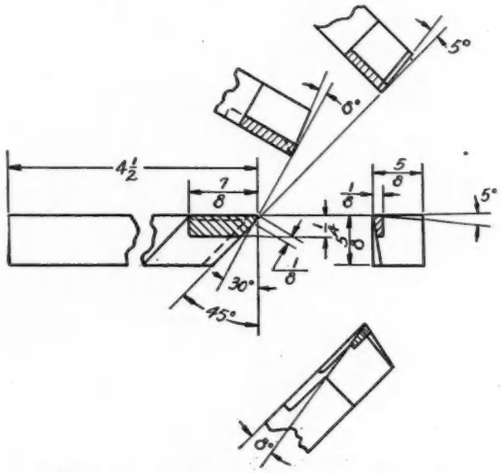


Boring tool for gun iron brake drums

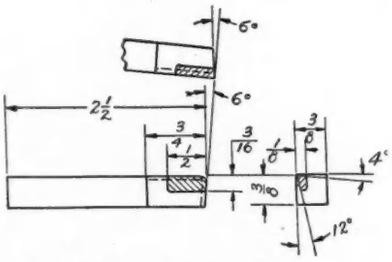
**Group of tools used by the Studebaker Corp.**




Bit for facing head end of piston




Tool for turning vibration damper flywheel




Tool bit for water pump, oil pump and distributor bracket

Those who have devoted a good deal of time to the grinding problem are convinced that wet grinding will give best results, since adequate cooling will keep down the temperature of the tip and materially relieve thermal strains on the brazed joints. However, where the grinding equipment or setup prevents the use of a copious flood of water, wet grinding should not be attempted and, with the proper precautions, the job can be well handled by dry grinding, but in this case the tip must not be cooled in water.

So far as we can find, there is ample evidence that a well-ground edge such as may be produced on a good grinder by a capable operator is suitable for all general purposes without further preparation. This is particularly true of cast iron applications as pointed out by Coleman Sellers, 3rd, in "The Use of Tungsten Carbide as a Cutting Material on Heavy Machine Tools," which was read at the A.S.M.E. semi-annual meeting this year.

On the subject of grinding, as digested from the reports of about 75 concerns, the A.S.M.E. Special Research Committee on the cutting of metals remarks, "Apparently the practice of grinding tungsten-carbide tools differs as greatly as the grinding of tool steel and high-speed-steel tools. The importance of maintaining the correct rake and clearance angles on tools used for production work which can only be accomplished by machine grinding, seems to be generally disregarded. The subject of small tool grinding warrants further investigation." Nevertheless, despite a concerted lack of standardization in grinding cemented-tungsten-carbide tools, a good deal is known about the grinding problem due to the efforts of a large number of automotive manufacturers and the cooperation of the manufacturers of grinding wheels, grinders, and cemented-tungsten-carbide tools. An excellent example of this is a survey of grinding methods by H. W. Wagner of the Norton Co. contained in a paper, "Fixed Method Preferred to Free Hand Operations," published in *Automotive Industries,* March 1, 1930.

Some degree of standardization in grinding procedure is evidenced by the following. Grinding has been divided into three distinct steps—1. Roughing, 2. Finishing, and 3. Lapping, where necessary. General Motors Research has adopted 60-P carborundum wheels for roughing, 100-T for finishing, and 200-I Star wheels for lapping. Timken-Detroit Axle Co. uses 60-I Crystolon for roughing and 100-I Crystolon for finishing. At Studebaker they use a 90 or 100 grit wheel for roughing and a 120-H Crystolon wheel for finishing. This might also be supplemented by Table III which gives Firth-Sterling recommendations.

Lapping after grinding as an essential operation has aroused considerable comment and is still largely a matter of individual preference. A number of well-informed experimenters say that lapping is not necessary if the finish grinding job is done accurately. They are positive about this in the case of cast iron applications, but agree that lapping is probably necessary on certain non-ferrous applications and, particularly, on grooving tools for pistons. Quoting again from the excellent report of the A.S.M.E. Committee, we find the following reference: "Of 40 companies, eleven reported the use of tungsten-carbide tools lapped or stoned. The lapping has been done mostly by hand, using a cast iron lap, though in a few cases, disk lapping machines are used, silicon carbide or diamond dust with oil being used as an abrasive. *The advantage of lapping tungsten-carbide tools is questionable.*"

Standardization of tool forms, although highly desirable, is largely in the formative stage and may be considerably delayed because of the complexity of the problem. Perhaps the best exposition of this will be found in the following statement made by R. L. Templin, Chief Engineer of Tests, Aluminum Co. of America. "I am a firm believer in the fact that speeds and feeds for cutting tools are not only closely interrelated but they are also dependent on many of the other factors involved in the cutting

operations, such as form of tools, work to be done, condition of the machine tool, design of the machine tool, character of the coolant used and the material being machined. All of our experience tends to substantiate this viewpoint."

Some of the most careful work on the determination of the proper tool form for various materials has been done by the manufacturers of cemented-tungsten-carbide tools. Table 1 shows the recommendation developed by the Carboloy Co., Inc., while Table 2 gives recommendations by Thomas Prosser & Son. The latter are said to be based upon thousands of tests with Widia, conducted in the research laboratories at the Krupp plant in Germany.

Based upon the experience in their own laboratories, General Motors Research recommends a front clearance angle of 4 deg. for most applications and 6 deg. on malleable iron castings. For the back slope they start with an angle of 0 deg. and adhere to that wherever possible. Side clearance angle varies from 4 to 10 deg. depending upon conditions.

On aluminum, R. L. Templin has obtained excellent results with a solid cemented-tungsten-carbide toolbit lathe tool having a top rake of 50 deg. and a side rake of about 15 deg. Such a tool was used with cutting speeds up to 1200 ft. per min. without its limit being reached. On pure aluminum good results have been had up to 3000 ft. per min.

To show the character of the tools used for various kinds of work in the automotive field, some typical examples taken directly from the tool drawings of a number of well-known automobile manufacturers are shown in this article. Broadly speaking, standardization already exists to some degree because most of the tools are made to the manufacturer's recommendation, with variations only where a change is necessitated by special conditions.

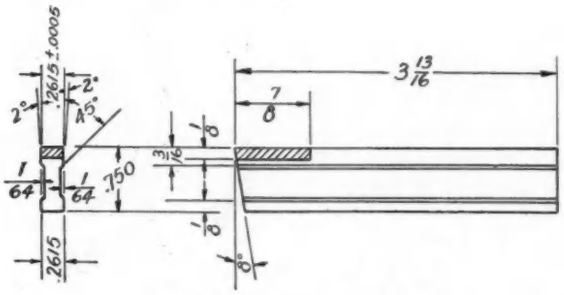
Machine shop research work, which has grown apace with the ever increasing applications, has developed the fundamental fact that the tool tip used at present is too small to be adequate. Some of the larger users are convinced that the logical development is the use of larger tool tips, and they have already taken the initiative in that direction. Many of the early and baffling difficulties are now laid at the doorstep of the small tool tip. Among these might be mentioned failures in grinding and during machining, manifested by loosening up at the brazed joint and minute cracks in the cutting edge as well as the phenomenon of the wearing away of the top surface of the tool tip which is so ably explained by W. H. McCoy of General Motors Research in the paper read before the production meeting of the Society of Automotive Engineers. The small tip develops so much heat and its mass is so inadequate that the heat is not conducted away rapidly enough and, consequently, thermal stresses are set up which usually result in a failure of the tool tip or breakdown of the brazed joint. And at the present time the answer seems to point to the use of a larger tool tip, that is, one of adequate size having sufficient mass to conduct the heat developed at the tip.

By way of encouraging this constructive development, on Sept. 1 was announced a definite reduction in prices of cemented-tungsten-carbide tips of certain size, thus making it possible to increase the size of the tool tip without materially increasing the total cost of the tool. This is a hopeful sign to the tool engineer who has been forced to cut the size of the tool tip probably beyond his better judgment because of serious price considerations.

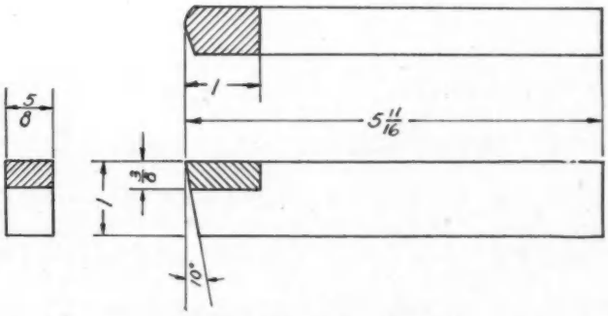
At this stage of development, it is hardly possible to do more than generalize about speeds and feeds with cemented-tungsten-carbide tools. As was remarked earlier, speeds and feeds are interrelated with so many variables that no standardization can be expected at the present time. Of what avail would standardization be when the tool application is limited by tool conditions, machine conditions and machine design? This much is established, that usually these tools permit the maximum utilization

*(Turn to page 559, please)*

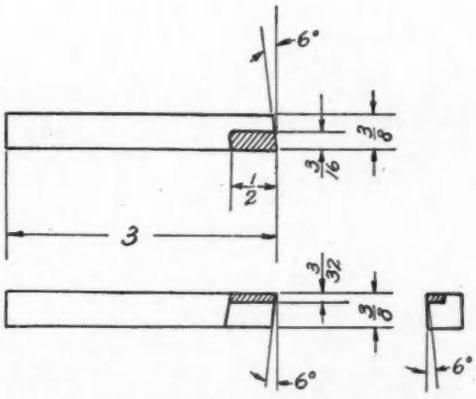
**Group of tools used by the Reo Motor Car Co.**




Turning oil belt on pistons




Finish turning O.D. on piston




Turning piston open end to length

# Record Attendance Hears Six Papers at

Gordon Lefebvre, vice-president of the Oakland Motor Car Co., proved a real inspiration to the staff artist as well as the S.A.E. members + +

C. E. Wilson, vice-president of the General Motors Corp., gave the members some real food for thought. The artist's impression is shown above at the right + + + + + +

## C. E. Wilson, vice-president General Motors Corp., points out significant elements contributing to the development of mass-production systems, in an address at the Annual S. A. E. Production Dinner

ELEVEN significant elements contributing to the development of the American mass-production system were singled out and discussed in characteristic fashion by C. E. Wilson, vice-president, General Motors Corp., in addressing an audience of about 700 production men attending the Annual Production Dinner last week in Detroit. A signal tribute was paid to the machine tool builders who contributed to the development of single purpose machine tools and to the manufacturers of materials handling equipment for their share in making the present low-cost production possible.

Briefly, the 11 elements are: the introduction of high-speed tool steels; the evolution of single purpose machine tools; adoption of standard cost accounting systems; development of adequate systems of wage payment and time studies of operations; progressive assembly methods and plant layouts to facilitate them; mechanization of materials handling by means of conveyors and other types of equipment; rational control of production and inventories; careful design of jigs, fixtures and related machine accessories; budgeting control; the selection and training of employees; and the standardization of the design of parts so as to create similar types of manufacturing operations with the object of producing many different parts on the same machine.

# S. A. E. Production Meetings in Detroit

John Younger, vice-president of the S.A.E., sounded the call for a higher type of executive in the sales, financial and administrative branches of the industry + + + + + +

J. A. Bohannon, president of Peerless, contributed much to the unprecedented success of the meetings + +

Projecting into the future, C. E. Wilson visioned the potentialities of industrial chemistry in producing synthetic products to supplement or displace many of the materials now in use. He predicted an increasing growth in the application of economics to production problems. To stabilize employment, the speaker suggested the building up of inventories during the seasonal sales lags. The extension of gas and electric welding to simplify parts, to reduce weight and costs, may prove to have unbounded possibilities in the future.

Coming to the problem of the moment, Mr. Wilson attributes overproduction and depression to the breakdown of the present system of distribution. This, coupled with a lack of understanding of the present financial structure, are the serious deficiencies and will continue to be until a serious effort is made to study and understand the basic economic principles that underlie these problems.

What may prove to be the birth of a new era in S.A.E. activities was contained in the suggestion of John Younger, vice-president of the society, in charge of the Production Activity, relating to the creation of an Economics Activity of the S.E.A. to attract higher executives in the sales, financial and administrative branches of the automotive field. In addressing the dinner meeting, he urged everyone to consider this seriously as the next logical step in the development of the S.A.E. and the automotive field as a whole.

The production dinner with its generous turnout of production men due to the untiring efforts of Phil Kent and the Detroit Section of the S.A.E. served as a fitting climax to what was probably the most successful production meeting in the history of the S.A.E. Three sessions, each comprising two papers, attracted at least 300 important executives and production men, many of whom participated in the spirited discussion which these papers evoked.

Two of the most important production executives in the industry, J. A. Bohannon, president, Peerless Motor Car Co., and Gordon Lefebvre, vice-president, Oakland Motor Car Co., presided at two sessions of which the meeting consisted.

Because of the real significance of the papers, as evidenced by the interesting discussion which followed each one, a complete interpretation and review of each

Paul N. Lehoczky of the Ohio State University talked on the subject of "The Effect of Time on Production Costs" + + + + + +

W. H. McCoy predicted the development of special grades of cemented-tungsten-carbide materials for cutting tools + + +

E. J. Bryant of the Greenfield Tap & Die Co. gave a number of instructive tables on wear allowance manufacturing tolerance on gages

paper will appear next week, while the following will be confined to a brief note of some of the high spots of the session.

The qualifications and the necessary background of training for a tool engineer were discussed in detail by O. B. Jones of the Detroit School of Applied Science in an excellent paper entitled, "The Tool Engineer's Place in Mass Production."

Among other things, Mr. Jones suggested that a tool engineer must have mechanical ingenuity, be open minded, and be of the highest executive type. His training should include something of the fundamental laws of mechanics, a knowledge of machine feeds and speeds, but above all things he must have a good grasp of the principles of engineering economy and be able to weigh every job in the light of all of the factors involved. In the course of the discussion which followed, Mr. Jones admitted that his conception was highly idealistic and designedly so in order to set a high mark at which to shoot.

The timely subject of production by economic lot sizes as a means of reducing costs was ably handled by Paul N. Lehoczky of the Ohio State University in his paper, "The Effect of Time on Production Cost." In opening the author shows the necessity for studying the size of intermittent production lots because of the effect of capital investment, depreciation, interest charges, and a number of other variable factors that enter into any problem involving the element of time. Given a certain definite amount of business per year, he shows the effect of producing all the pieces at one time, in two setups, and in an increasing number of setups showing by a simple calculation that there is a minimum point at which all factors balance so as to give the lowest cost.

Prof. Lehoczky then develops a basic formula, which in simplified form, may be applied to any production problem. He closes with the thought that the application of economic production lots is indicated wherever capacity is greater than production, especially if the equipment can be used for other purposes.

What are the future possibilities of cemented-tungsten-carbide tools? This is answered by W. H. McCoy, General Motors Corp., in, "The Future Development of Tungsten Carbide as a Cutting Tool." He predicts the development of a number of special grades of cemented-tungsten-carbide materials, possibly some containing another type of binding material to replace cobalt. His study appears to indicate that the future development of this material lies along two distinct lines:

1. Development of new physical properties to meet certain specific applications by the use of binders other than cobalt.
2. Development of cemented-tungsten-carbide possession diverse physical properties by means of the regulation of the size of the carbide particles which are to be bound with the alloy binders.

As might be expected, this paper aroused considerable discussion concerning the wide applications of cemented-tungsten-carbide tools and the possibility of using them on the new and existing equipment in automotive plants.

R. L. Templin, Aluminum Co. of America, an outstanding authority on the physical properties of aluminum, contributed, "New Developments in Machining Aluminum and its Alloys," which dealt with the latest information on the subject, particularly the use of cemented-tungsten-carbide tools. Mr. Templin emphasized again the essential form of a cutting tool best suited for machining aluminum and its alloys, noting that it should have a top rake of about 45 deg., a side rake of about 15 deg., a front or back clearance of about 7 deg., making the total included angle of the cutting edge approximately 38 deg. For the coolant he recommends a mixture of lard, oil and kerosene

R. L. Templin of the Aluminum Co. of America spoke of the best form of cutting tools for machining aluminum + + + + + +

J. H. Hough of the Mathews Conveyor Co. demonstrated the application of the A.S.M.E. formula to conveyor problems + + +

O. B. Jones of the Detroit School of Applied Science showed just where the tool engineer fitted into the picture of mass production

usually of equal parts. In some cases, satisfactory results are obtained by using mixtures of soluble oil and water. He observed that the introduction of cemented-tungsten-carbide tools, together with the increasing use of high-speed machines, is very favorable to the proper machining of aluminum and its alloys. The paper closed with a detailed bibliography on the machining of aluminum and alloys.

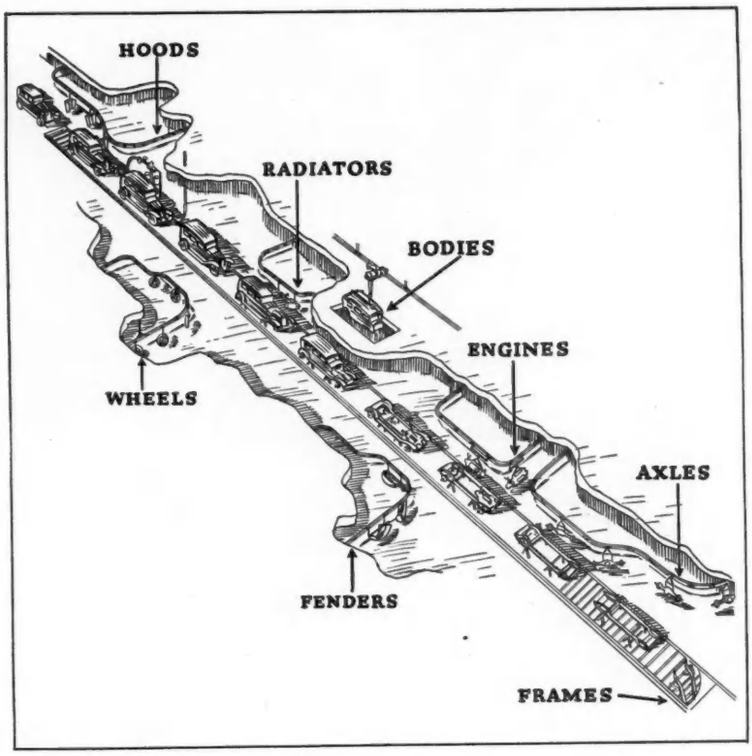
The highly technical aspects of the wear allowances and manufacturing tolerances on gages of various types were discussed by E. J. Bryant, Greenfield Tap & Die Corp., in the paper entitled, "Wear Allowances and Tolerances on Gages." This paper contained a number of tables showing tolerances for cylindrical plug gages, go and not go thread gages, and the N.S.T.C. product limits and inspection gage tolerances. In the discussion which followed, D. W. Ovaitt of the General Motors Corp. suggested that Mr. Bryant also include the General Motors standards for allowances and tolerances for metal fits. Among the practical considerations in the manufacture of gages, Mr. Bryant stressed the importance of the surface and referred to the recommendations for lapping as a means of increasing life. He also stressed the necessity of properly cleaning gage blocks. He showed the necessity for periodical inspection of gages and said that it is good practice to have gages inspected for size at regular intervals. The speaker cited some cases where gages are inspected every hour, once a day, or once a week. In closing he expressed the ideals of the A.S.A. that worn gages should be rejected when they have reached the wear limit. Incidentally, the wear limit for each gage should be definitely established whether it be the basic size or an under size.

When to install materials handling equipment, what type to select, and how to determine the most economical installation were discussed in detail by J. H. Hough, Mathews Conveyor Co., in, "Conveyors in the Automotive Industry." An unusual feature of his discussion was the introduction of the A.S.M.E. formula and several practical examples illustrating its application. Another feature was a table giving the prices per foot of various kinds of materials handling systems in various sizes. This is probably the first time that up-to-date material of this nature has been given authoritatively. This paper opened with a discussion of various types of materials handling equipment and their application. Mr. Hough also introduced slides showing many unusual installations in plants outside of the automotive industry.

## Next Week:

**Crankshaft Practice, a comprehensive survey article by Athel Denham, will appear in the issue of October 25.**

**This is one of the most important production articles to appear in print this year.**




# Unusual Plant

**Refinements in the materials handling methods has made possible the steady flow of literally hundreds of combinations of body models and color options + + + +**

**With the 30-day building schedule as a basis, Form 1 is made up giving the daily parts manufacturing schedule for the month at the Studebaker plant + + + +**

W1159

Studebaker

**CAR PARTS PRODUCTION SCHEDULE**

INSTRUCTIONS:—Entries made daily in duplicate by Production Department from W1158. Original to dept. foreman, duplicate retained.

| | Part No. | Part Name | No. Required Per Car | SCHEDULE Monthly | SCHEDULE Daily | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | |

W1110

Studebaker

**CURRENT CAR PRODUCTION AND SHIPMENT REPORT**

INSTRUCTIONS: Made in multiple daily by Chassis Stores Division. Copies distributed as required.

| Symbol | Model | SCHEDULE Daily | SCHEDULE Monthly Accum. to Date | PRODUCTION Daily | PRODUCTION Monthly Accum. to Date | SHIPMENTS Daily | SHIPMENTS Monthly Accum. to Date | Month Order & Orders on Prod. to Date | O. K's Cars On Hand | Symbol | Model | SCHEDULE Daily | SCHEDULE Monthly Accum. to Date | PRODUCTION Daily | PRODUCTION Monthly Accum. to Date |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PRESIDENT 8's 136" | | | | | | | | | | STUDEBAKER 6's 114" | | | | |
| 90-X1 | Reg. 7 P Sedan | | | | | | | | | 53-W1 | Reg. Sedan | | | | |
| 90-X2 | State 7 P Sedan Mohair | | | | | | | | | 53-W2 | Regal Sedan | | | | |
| 90-X4 | State 7 P Sedan Broad. | | | | | | | | | 53-L1 | Landau Sedan | | | | |
| 90-M | State 7 P Limousine | | | | | | | | | 53-F | Club Sedan | | | | |
| 90-C | State 4 P Victoria | | | | | | | | | 53-Q1 | Reg. Coupe 3-P | | | | |
| 90-B9 | State 5 P Brougham Mohair | | | | | | | | | 53-Q3 | Reg. Coupe 4-P | | | | |
| 90-B4 | State 5 P Brougham Broad. | | | | | | | | | 53-T1 | Reg. Tourer | | | | |

W1215

Studebaker

**STATUS OF ORDERS, CARS ON HAND, AND BODY AND CAR SCHEDULES**

INSTRUCTIONS: Made in multiple daily by Chassis Stores Division. Copies distributed as required.

| Symbol | Model | Orders on Hand | CARS ON HAND O. K'd | CARS ON HAND Not O. K'd | Car Sched. + or — | Daily Car Schedule | Bodies on Hand | Body Shipping + or — | Balance to Build this Mo. | Symbol | Model | Orders on Hand | CARS ON HAND O. K'd | CARS ON HAND Not O. K'd | Ca |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PRESIDENT 8's 136" | | | | | | | | | | DICTATOR 6's 115" | | | | |
| 90-X1 | Reg. 7 P Sedan | | | | | | | | | FC-W1 | Reg. Sedan | | | | |
| 90-X2 | State 7 P Sedan Mohair | | | | | | | | | FC-W2 | Royal Sedan | | | | |
| 90-X4 | State 7 P Sedan Broad. | | | | | | | | | FC-F | Regular Club Sedan | | | | |
| 90-M | State 7 P Limousine | | | | | | | | | FC-Q1 | Reg. Coupe 3-P | | | | |
| 90-C | State 4 P Victoria | | | | | | | | | FC-Q3 | Reg. Coupe 4-P | | | | |
| 90-B9 | State 5 P Brougham Mohair | | | | | | | | | FCB2 | Regal Brougham Mohair | | | | |
| 90-B4 | State 5 P Brougham Broad. | | | | | | | | | FCB4 | Regal Brougham Bed. Cd. | | | | |
| 90-L1 | Reg. 7 P Tourer | | | | | | | | | FCT1 | Reg. Tourer 5 P | | | | |

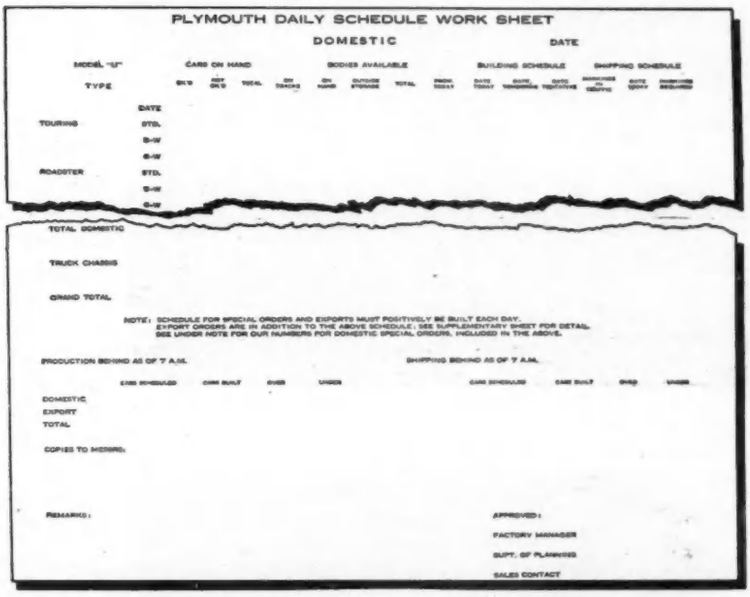
**Form 2 gives each day a report of sales orders by models and body types, while Form 3 gives similar information but in more detail and is especially designed for the needs of the Studebaker shop scheduling**

THE smoothly flowing stream of cars off the four main assembly lines in the Studebaker plant at South Bend focuses attention upon the coordination of their unusual materials handling equipment and the functioning of the planning organization whose control makes this possible. In all probability only those very close to the planning department realize the complexity of the control system and the amount of real labor and research work involved in making it function smoothly. Yet, it is the refinements in materials handling methods and production scheduling that have made available the literally hundreds of combinations of body styles, color options and other specification changes that

# Methods Meet Definite Shipping Schedules

**Production program, based upon a forecast made by the management and sales department, coordinates factory operations and provides a smooth flow of cars on the delivery line**

**The daily work sheet used by Plymouth as the basis for scheduling the work on assembly line is shown as Form 4 + + + +**


PLYMOUTH DAILY SCHEDULE WORK SHEET

DOMESTIC

DATE

MODEL "U" — CARS ON HAND — BODIES AVAILABLE — BUILDING SCHEDULE — SHIPPING SCHEDULE

TYPE — DATE

TOURING — STD. — S-W — C-W

ROADSTER — STD. — S-W — C-W

TOTAL DOMESTIC

TRUCK CHASSIS

GRAND TOTAL

NOTE: SCHEDULE FOR SPECIAL ORDERS AND EXPORTS MUST POSITIVELY BE BUILT EACH DAY. EXPORT ORDERS ARE IN ADDITION TO THE ABOVE SCHEDULE; SEE SUPPLEMENTARY SHEET FOR DETAIL. SEE UNDER NOTE FOR OUR NUMBERS FOR DOMESTIC SPECIAL ORDERS, INCLUDED IN THE ABOVE.

PRODUCTION BEHIND AS OF 7 A.M. — SHIPPING BEHIND AS OF 7 A.M.

CARS SCHEDULED — CARS BUILT — OVER — UNDER — CARS SCHEDULED — CARS BUILT — OVER — UNDER

DOMESTIC

EXPORT

TOTAL

COPIES TO MESSRS.

REMARKS:

APPROVED:

FACTORY MANAGER

SUPT. OF PLANNING

SALES CONTACT

are accepted as a matter of course.

Complete details of one very interesting control system were given in the article entitled "Synchronizing Materials to the Assembly Line," which appeared in *Automotive Industries,* Oct. 4. And it is the object of this article to give in compressed form the corresponding features of the control systems in other automotive plants. Materials handling methods and something about the plant conditions controlling these will be given in greater detail later in the article.

Of the many conditions which affect production control and the details of materials handling equipment, the influence of plant layout, kind of product, variety of product and sales volume are probably of greatest importance. The effects of these will be noted in analyzing the procedure in the representative plants described here.

Some idea of the production planning problem at Studebaker may be gained by considering the models listed on Form 3, which will be described later, and visualizing the possible combinations due to color options, wheel options and the other variations. The general program of plant activity is based upon a seasonal forecast by the management and a more definite quarterly estimate from the sales department. This is followed by a fixed 30-day building schedule based on sales requirements which determines for every month the average production per day, the number of days per week and number of

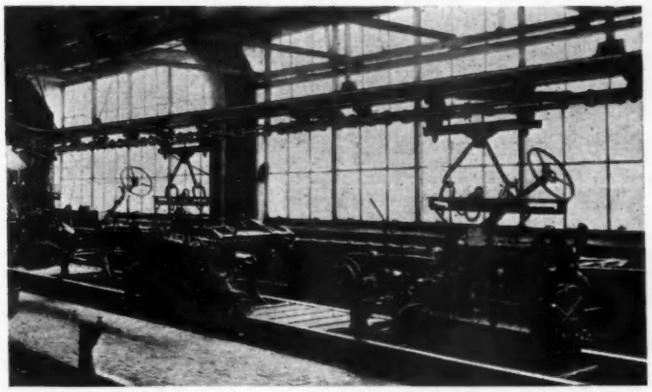
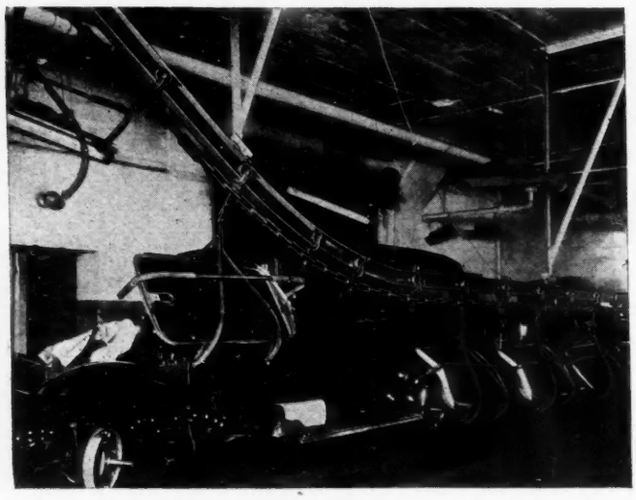
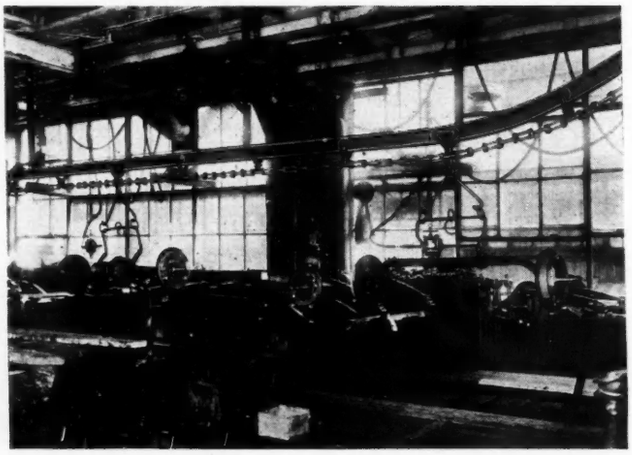


**Fig. 1—The engine conveyor at Studebaker shown here passes between two of the four assembly lines + + + + + +**





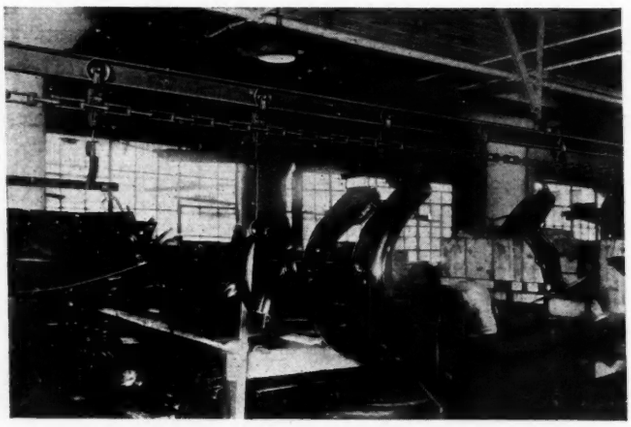


Fig. 2—Finished radiator shells are carried to the assembly line on a monorail conveyor at the Studebaker plant + + + + +

Fig. 3—Front and rear axles for four different chassis are carried to the assembly line in sets

Fig. 4—The sheet metal conveyor supplies a steady flow of mud guards, etc. + + +

hours per day. By this means the various plant activities are closely controlled and are designed to follow the rise and fall of the sales curve.

Daily shipments are made in accordance with the shipping schedule provided by the sales department three days in advance of the date of shipment. This schedule gives complete details concerning body styles, color options, etc.; also the carload lot combination.

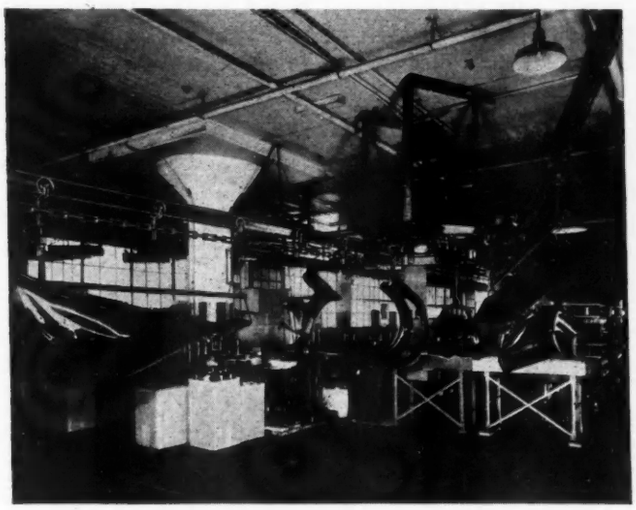
With the 30-day building schedule as a basis, Form 1 is made up giving the daily parts manufacturing schedule for the month. This goes to the foremen and superintendents and shows them exactly how to chart the progress of work. Every night a special force of clerks checks the movements of finished material from various zones and notes the quantities on a special slip which is turned in to the planning department. This latter check enables the foreman to keep close control of output and the conditions in his department.

Form 2 is a daily report giving the sales orders by models and body types. This is sent to department heads and to other individuals upon request. One function of this form is to provide a cumulative total to show the "over" and "under" conditions against sales orders.

Form 3 is another daily report somewhat similar to Form 2 but giving more detailed information of a different type. It also goes to the department heads but is especially designed for the needs of the shop scheduling department. This form is checked and brought up to date every night by a clerk who makes an accurate record of finished cars, bodies and major units and also corrects the column marked "plus" or "minus" which shows the status of orders.

At Studebaker the central shop scheduling department exercises its control by means of a teletype installation. Recording teletype instruments are installed in the various key departments thus providing a detailed, typewritten schedule definitely controlling the activity in that department. Teletype control is concerned with the scheduling of the sequence of the major units, bodies, sheet metal and wheels. These schedules are made out 18 hours in advance to provide the necessary time interval for enameling and color finishing. The teletype schedule gives the sequence of each part on the conveyor, classifying the type, color, and other variations for every hour of the day beginning with the first hour of operation.

The detail involved can be appreciated only by visualizing the fact that each major unit feeder conveyor carries parts of a similar nature for four different assembly lines. An ingenious method, particularly commendable because of its sheer simplicity, has been devised to control the sequence of parts as they are placed on the feeder conveyors. At certain key stations a representative of the shop scheduling department writes out small, individual tickets containing the car reference number which corresponds to the identification mark for each item on the teletype schedule sheet. These cards are piled up in sequence and control the action of the man who loads the feeder lines. Each conveyor bracket



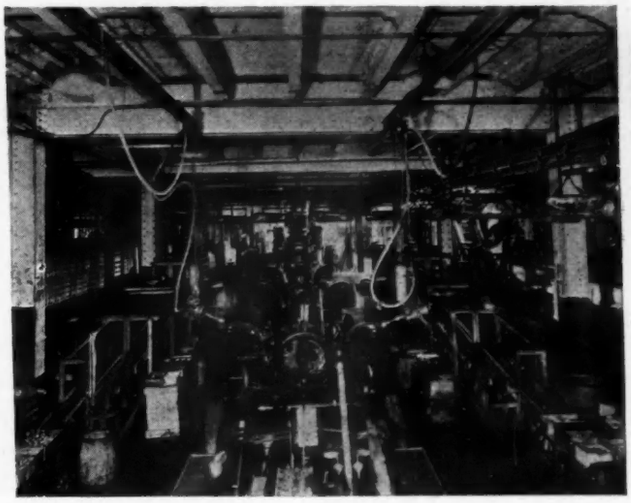


Fig. 5—Sharp turns are negotiated by the sheet metal conveyor in the Studebaker plant

Fig. 6—The wheel assembly line for the Pontiac. Note the overhead conveyor at the right and rear for finished radiators + + +

is provided with a little hook on which this ticket is hung so that, ultimately, all major parts intended for a certain scheduled car will meet the right chassis on the assembly line. Incidentally, this little device has proved to be a valuable money-saver, as it eliminated the special wired tags which were previously used, and also eliminated the labor and time required to fasten and remove them.

Another interesting feature of this scheme which greatly impressed the writer was the facility with which it controls gaps on the feeder line conveyor occasioned by differences in the speeds of the assembly line conveyors when production is low. Briefly, the scheduling department gives the sequence of every hook or bracket on the conveyor. Wherever a gap is necessary the scheduling ticket is marked "zero" instead of an identification number. This tag is hung on its respective hook and the bracket travels empty.

## Clearing Stations Are Checked Each Night

To maintain an accurate check of the condition of finished parts throughout the plant, central clearing stations or zones have been established at which the parts are accumulated. A night force of clerks checks these clearing stations daily and prepares for the following morning a complete inventory of major units. This information is invaluable to the scheduling department. To provide for contingencies small banks of major units such as bodies, wheels and sheet metal are kept on hand. Operating on an 18-hour lag, the schedule admits of great flexibility although it is largely controlled by the available bank of bodies. As a rule the schedule is based rigidly upon available bodies, although in some cases a schedule will be issued on a promise of delivery from the body plant.

Another type of planning program is found at Plymouth. Here the manufacturing activities are tentatively based upon a monthly forecast which is broken down into average daily requirements. In keeping with the present-day tendency there are no stores departments and no finished stock on hand except a small bank of engines. Depending upon periodic requirements, a maximum float is determined for each manufacturing department and the work is laid out so as to provide a five-day bank. Naturally, the amount of the bank is a function of the maximum float at any particular time, and the float in turn depends upon the condition of the sales schedule.

Scheduling for the assembly lines is based on the shipping instructions which appear on Form 4. The flow of finished parts is a responsibility of the departmental foreman, the schedule in his department being based upon the float and banks. And, the progress of production in his department is controlled by the available bank of raw materials. This really controls the situation, for when production lags, the available supply of material is either decreased or stopped, controlling the work in the same fashion.

At Reo, production is based upon a seasonal forecast with a definite monthly production estimate reduced to average daily requirements based on a 20-day month. Blanket orders for 90-day requirements are placed with outside vendors and monthly releases are scheduled against these. The monthly schedule is sent to every manufacturing department and is checked and revised every 10 days. The flow along the main assembly lines is based on the daily shipping schedule originating in the assembly department. Here they have a central stores department which delivers material to the manufacturing department and the assembly lines, daily or every other day, depending upon conditions.

Shifting from the problems in the automobile plant we are privileged to study the planning at Continental Motors, where about 78 distinct engine specifications are assembled over one assembly line, as was described in *Automotive Industries*, Nov. 30, 1929. Here the

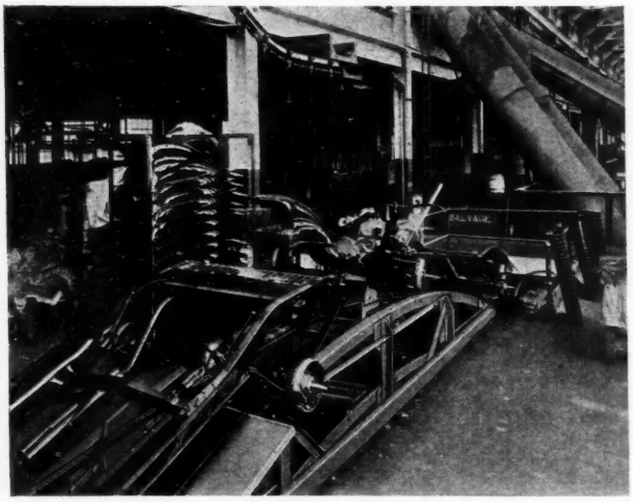


Fig. 7—On the mezzanine floor shown, all sheet metal parts are completely finished. On the hump in the conveyor line all sheet metal parts are installed in the Oakland factory + +

building schedule for each model is determined at a production scheduling meeting held every Thursday to determine the schedule for the week beginning the following Tuesday, thus giving an overlap of four days for processing the parts. This meeting is attended by representatives of the sales and purchasing departments, planning, manufacturing, and the works manager. The four-day overlap period gives the foreman time to revamp his schedule and to route parts in the proper sequence for the assembly line.

The sequence of engines along the assembly line is definitely fixed by the schedule, and parts from each department meet the line at the proper moment because the foreman knows beforehand exactly the sequence in which his parts must come through. As a final check, the inspector in each department, who is the last man to handle the finished part, has a copy of the departmental schedule and is thus able to feed the assembly line in proper sequence.

As a protection against shortages on the motor line of items which are purchased from outside sources, a five-day reserve supply of each part is set aside in cardboard cartons or sacks to be used only in case of shortage.

No changes in schedules are made until a study of shop conditions has been completed. Increases in schedule are, of course, readily made, provided they do not exceed productive capacity. In the interest of economy, in the case of large parts, such as cylinder blocks, crankcases and crankshafts, of which three or four models are machined over one line of machines, a bank of finished parts is maintained to eliminate setup changes if the schedule is increased. Wherever possible, a full month's run of each part is produced at one setting.

Materials handling methods vary with plant conditions and are influenced largely by the layout of the plant. For the purpose of this study a number of unusual features in each plant, whose scheduling methods were described earlier, is given in detail.

The recent conveyor installations at Studebaker helped to solve materials handling problems of real technical difficulty in tying together widely separated manufacturing plants. For example, we have already noted the four main assembly lines which are served by feeder conveyors, each of which feed all four lines. All major units are carried on overhead monorail conveyors and definitely scheduled with the exception of the closed-type conveyor which carries a moving bank of gas tanks.

## Body Handling a Distinct Problem

Handling bodies is a distinct problem and was described completely in the article entitled, "Studebaker Body Handling Plan Saves Storage Space," which appeared in *Automotive Industries*, June 28, 1930.

Fig. 1 shows the Studebaker engine conveyor just passing between two of the four assembly lines. Under normal conditions the engine assembly line is timed about 2½ hours away from the chassis line. In Fig. 2 is shown another feeder conveyor carrying finished radiator shells to the final assembly line.

Front and rear axles, in sets, travel along the feeder conveyor shown in Fig. 3 and supply axles for the four different chassis. Figs. 4 and 5 show two views of the sheet metal conveyor, with Fig. 5 giving an interesting detail of the sharp change in direction in the conveyor line.

The Oakland materials handling conveyor system also presents some unusually interesting features. Examine, for example, Fig. 6, which gives a view of the Pontiac assembly line at the wheel assembly station. Wheel assemblies will be seen on each side of the line in the chute which forms the leaving end of the wheel elevator. In most plants wheels are assembled on an upper floor and reach the assembly line by way of chutes. At Oakland, it was found more desirable to locate the wheel department in the basement and send the wheels up an elevator instead of down the chute. Note at the extreme right, and in the background, the overhead conveyor with special racks carrying finished radiators to the assembly line.

A really ingenious method of capitalizing a constructional feature is shown in Fig. 7. The mezzanine houses all enameling equipment, and all sheet metal parts are completely finished here. The chassis line on the lower floor is carried up to the mezzanine as it emerges from the spray booth. It is carried over the hump, Fig. 7, and travels down again to the main floor. At the hump all sheet metal parts, including the gas tank, are installed, thus eliminating practically all of the handling usually required.

The foregoing gives a necessarily brief treatment of some of the material handling problems and the way in which they were finally worked out. The most interesting feature, however, is the ingenious manner in which the scheduling of production and the materials handling equipment have been coordinated to provide a smooth flow of cars against a definite daily shipping schedule.

# Future Production Activity Forms in Economic Mold

(*Continued from page 543*)

ers in order to build up and maintain an efficient organization with which to meet a constantly growing and keener competition.

The method which seems to give the best results, both from the viewpoint of imparting information concerning management's methods, policies, ideals, and for the purpose of developing potential leaders, is known as "the conference method." Discussion by small groups of executives based upon material furnished by the management brings out many ideas and suggestions for improvements which may be used by other group members or by the entire organization. This method also has the additional advantage of bringing management into closer contact with the foremen. It is naturally most satisfactory to all concerned to hold such conferences during working hours. There is no reason why, following the completion of an "education course" of this kind by foremen, that similar training methods cannot be applied to gang bosses.

When it comes to the workingman, the question of training or education devolves largely on the foreman and gang boss. Management's responsibilities are not ended with the creating of minor executives capable of securing loyal and interested cooperation on the part of the men working under them. Without injecting the appearance of "paternalism" into the picture, a quality odious to the modern workingman, management can assist largely in:

First—Enabling employees to provide for themselves and their families financial protection against sickness and accidents and death benefits at the lowest possible cost;

Second—Enabling employees to help themselves, their fellow workers and their families in financial, legal and other emergencies.

The formation of a self-governing industrial association within the organization, composed of all employees, whether workingman or executive, provides the ideal method of meeting the first two requirements. There should be no element of the typical "welfare organization" in such an association.

Such at least is the manner in which the management of the Chrysler Corp. regards some of the various problems confronting its manufacturing organization, as indicated by the application of the solutions and suggestions briefly indicated above.

# Successful Use of Cemented Tungsten Carbide Demands Careful Study

(*Continued from page 549*)

of the machine tool equipment. And, of course, nothing can be done beyond that until a new machine of a different type is installed.

As a rule, speeds are very much higher but feeds are fine, no greater than with high speed tools, in some few instances even finer. General Motors Research recommends the following speeds for roughing cuts: Cast iron, 160 ft. per min.; bronze, 300 ft. per min.; aluminum, 900 ft. per min.; speeds for finishing may be about double these if machine conditions permit. Thomas Prosser & Son's recommendations for Widia tools are as follows: "In general take the same or lighter feed and increase the cutting speed over that used with high speed steel in about the following proportions—cast iron, 200-500 per cent; soft steel, 100-200 per cent; hard steel, 75-100 per cent; brass, 400-800 per cent."

In conclusion, it might be well to stress a few of the fundamentals revealed by this survey which point the way to successful utilization of cemented-tungsten-carbide tools and, undoubtedly, explain the reason for some of the failures. 1. Necessity for definite organization to handle applications. 2. Study of high production applications yielding decided economies. 3. Centralization of grinding facilities. 4. Necessity for adequate grinding equipment. 5. Educational efforts aimed at overcoming operators' opposition and inertia to unfamiliar ideas.

Potential economies through the use of these new tools are so important that their importance cannot be overlooked on any high production job. And, when more is known about their utilization, usage on spectacular jobs will be subordinated to the real economies that are just around the corner on the common, every-day applications that have not yet been touched.

## Bibliography

"Carboloy," Vol. 1, Nos. 2-6; Vol. 2, Nos. 1-6; Vol. 3, No. 1.

"The Use of Tungsten Carbide as a Cutting Material," Coleman Sellers, 3rd, A.S.M.E. 1930 Semi-annual Meeting.

"Tungsten Carbide Cutting Materials," Frank C. Spencer, progress report of the A.S.M.E. Special Research Committee on the cutting of metals.

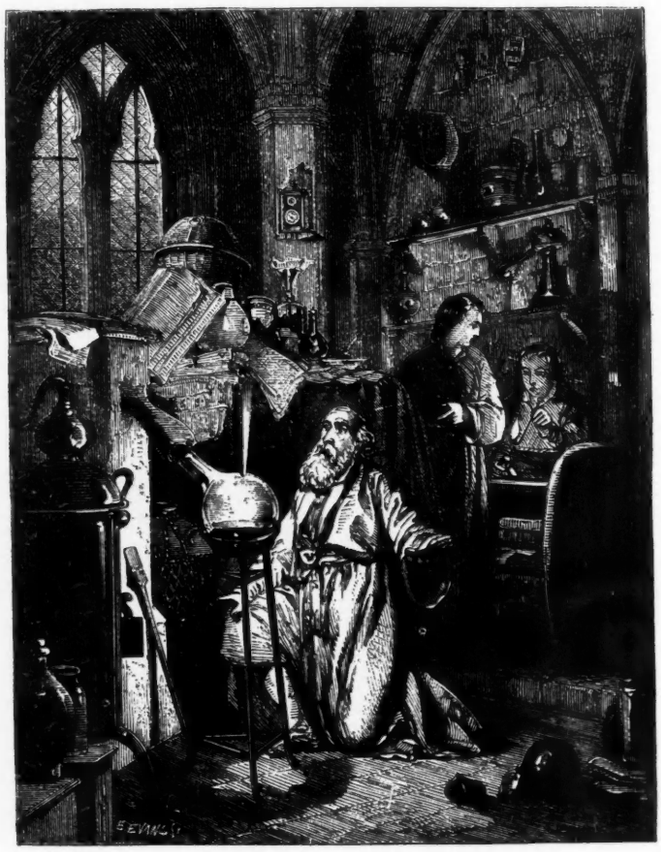
"Firthite," instruction booklet issued by the Firth-Sterling Steel Co.

"Widia Tungsten Carbide Tools," Roger D. Prosser, A.S.S.T. transactions.

"Grinding," William Sellers & Co., Inc.

"Cutting Tests with Cemented-Tungsten-Carbide Lathe Tools," T. G. Digges, A. S. M. E. 1930 Semi-annual Meeting.

# Improvement in Electroplating Quality



Alchemist in his laboratory

**Variations in standards of chrome plating evident on cars and equipment +**

**By Edmund B. Neil**
**Director of Research**
**Chilton Class Journal Co.**

WHATEVER else may have become evident during the past year in the field for electroplating and particularly chromium plating, it appears that if chromium plating is to continue to hold its position as a major means of decorating the exposed and interior parts of automotive vehicles, it will have to compete directly with the rustless or corrosion resistant irons and steels which during the year just passed have come into the field for similar purposes.

Much of the future of chromium plating for automotive decorative purposes depends upon its ability to compare with the advantages offered by the rustless metals. This does not mean to imply that chromium plating is "on its way out," but rather that if it is going to "stay in," it will have to continue to progress as a satisfactory means of "brightening" those parts which the public sees and by means of which it often judges the value of cars.

There are several pertinent reasons for this conclusion. A study of the quality of chrome-plated parts on various makes of cars produced during the year clearly shows that the quality of the work done may be divided into the three well-known classes—good, bad and indifferent. On a few cars the plating is excellent. On others it is notoriously bad, with many falling into an "in between" class wherein the quality, while acceptable from certain angles, has room for improvement.

There seem to be two major reasons for the wide variation in the quality of chromium plating as it is utilized on present-day cars. (1) As pointed out by the author in previous articles on this subject (*Automotive Industries*, Nov. 17, 1928, and Oct. 12, 1929) the thickness, characteristics and quality of the undercoatings have been reduced when chromium was to be applied, and (2) automobile manufacturers have not always been in a position to control the quality or uniformity of the plating on the various individual parts of their vehicles.

Referring to the first of these factors, it should be stated at the outset that the thickness of the undercoatings was not entirely the result of a desire to decrease costs, but rather that for a time at least the presence of a chrome surface was looked upon as a "cure all" not only for the problem of tarnish, but also of that of rusting or corrosion of the underlying steel base metal, regardless of what metal or metals mays have first been applied under the chromium. Now, however, it is generally recognized that chromium, due to its porosity, cannot be utilized for any other purpose than to prevent tarnish. In other words, its ability to protect the base metal against corrosion is comparatively small, so that with few exceptions, the undercoatings must be entirely relied upon for whatever rust resistance is to be obtained.

The second factor just mentioned is more difficult for the manufacturer to solve. In many instances

# Needed to Meet Competition

**Developments Discussed in Detail in this Article:**

**Quality of Plating on Present-Day Vehicles.**

**Nickel Plating at Low pH.**

**Heat Treating of Chromium Plate.**

**Durability Tests.**

**Control Methods.**

**Chromium Plating for Resistance to Abrasion.**

**Electrodeposition of Iron.**

**Future Prospective Progress in Electroplating.**

the car maker, either through lack of facilities or more often the desirable necessity of procuring his accessories and fittings from sources outside his direct control, is not in a position to assure an equality in the plating done on the various accessories he buys. The result is that even on the same vehicle some of the chromium-plated parts will stand up satisfactorily, whereas others will show signs of failure a few months after the car or truck has been placed in the hands of the owner. The condition causing this lack of uniformity is further aggravated by the fact that some accessory manufacturers do not themselves do their plating and "peddle out" the work to independent plating concerns conveniently located, so that there is a threefold opportunity for lack of uniformity in the various units he attaches to his vehicle prior to delivery. There is even an additional factor to be kept in mind, namely, that the dealer selling the car will attach accessories in the manufacture of which the car maker can exert no control whatsoever, yet which may have an influence in the customer's judgment of a given make of car when the time comes for him to purchase a new one.

It can now be said that the first of these two factors is solved; for once it is recognized that chromium plate is not a remedy for all the ills of plating (aside from the problems its application alone presents), that adequate undercoatings must be applied, and that in turn "the reputation of electroplating as a whole must stand or fall largely by the impression it makes on car owners,"* it seems reasonable that the steps necessary to effect this result should and can be taken. In other words good chromium plating for decorative purposes can be done, since the basic principles underlying the process are much better understood now than heretofore.

Unfortunately, although admitting that good chromium plating can and must be done if it is to survive for automotive decorative uses, there are many problems yet to be solved. It is our purpose here to state briefly and summarize some of these problems and what has been accomplished recently toward their solution.

**Plating at Low pH—** Last June, H. C. Mougey and W. M. Phillips presented a paper before the American Electroplaters' Society, at its Washington, D. C., meeting on "The Deposition of Nickel at Low pH," which *Automotive Industries* was then unable to present to its readers, due to restrictions placed upon the publication of material delivered at meetings of this society. A similar paper by Mr. Phillips was recently given before the Detroit meeting of the American Electrochemical Society. The subject discussed and the process described seemingly offer exceptional possibilities in overcoming some of the difficulties met with in nickel plating as performed commercially.

One plant, which presumably was operating its solution according to the recommended pH values (5.4 to 6.3), found that adding sulphuric acid seemed to produce better results. With this bath, the pH value had actually dropped to 2.5, although the low value was not at first detected, due to the use of a method of solution control which could not disclose this condition. This discovery resulted in experiments which definitely established the advantages and disadvantages of utilizing Watts type nickel baths at low pH values operated at temperatures in the range of 140° Fahr., with the following advantages and disadvantages:

## Advantages

1. **Increase in plating range.** Possible to use higher density without peeling or cracking at edges. Thicker plate within permissible time limits. See Figs. 1 and 2. These curves may be used when a short plating time is used.

* Oliver P. Watts, "The Plating on Radiator Shells," paper, American Electrochemical Society, Detroit, Mich., Sept. 25, 26, 27, 1930.

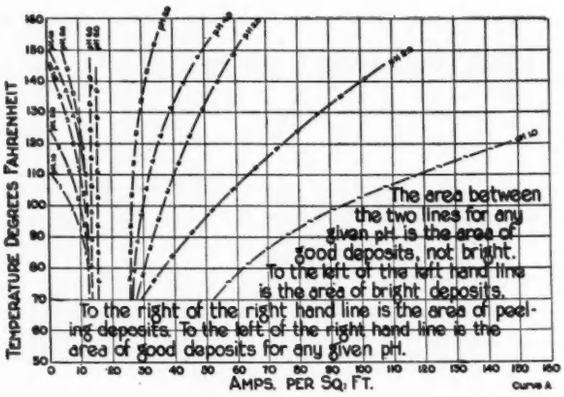



Fig. 1—Relation of temperature and current to good nickel deposits at varying values of pH + +

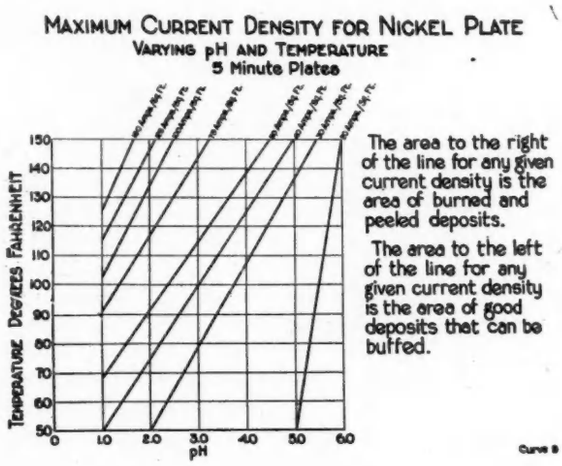



Fig. 2—Maximum current density for nickel plate with varying pH and temperature + + + +

2. **Better anode corrosion.** Problem of corrosion of anodes practically disappears.

3. **No turbidity in bath if pH is kept sufficiently low.** Critical value about 3.0.

4. **The nickel is supplied to the solution** from the anodes instead of by the addition of nickel salts. Loss due to drag-out taken care of by nickel from anodes with additions of free sulphuric acid.

## Disadvantages

1. **Greater Initial tendency for a low pH bath to cause pitting.** This possibly due to increase in the rate of solubility of the anodes, sludge, cracks and corners of tanks, anode supports, etc. In 18 months operation of both high and low pH baths, less trouble from this cause with the latter bath becomes adjusted.

2. **Low cathode efficiency.** Drop of about 25 per cent when pH is 1.0. This does affect current but is offset by other advantages.

3. **Too high anode corrosion** under some conditions. Drag-out tends to correct tendency to accumulate too much nickel in solution. Factor becomes an advantage when a percentage of lead anodes is used to replace nickel anodes, since lead reduces tendency to pit.

4. **Trouble if pH becomes too high.** Low pH enables plater to get out more work. If pH becomes too high he will find himself trying to obtain advantages of high pH bath, which is difficult if not impossible.

5. **Tendency for pH to increase gradually.** Not necessary to control low pH bath as closely as high. Limits 1.0 to about 2.5.

6. **High temperature low pH baths require proper tanks and linings.** Low pH baths, since best operated at high temperatures, rubber lined steel tanks with lead pipe heating elements recommended.

7. **For bright nickel plating,** a low pH bath gives best results at low temperatures, while high pH bath can be operated over a wider temperature range. Shown by Figs. 1 and 2.

8. **Low pH baths cannot be used to plate zinc base die-castings.** However, no bath entirely satisfactory.

## Heat Treatment of Chromium Plate

In addition to the study and now commercial application of low pH nickel plating solutions in the aim toward betterment of chromium plating, the G.M.C. research organization is responsible for another development possessing potential possibilities under certain conditions. R. J. Wirshing, in his paper before the Electrochemical Society, last month, presents the results of tests which indicate that through reducing the hydrogen content of the plate, a very material increase in the corrosion resistance of copper specimens chrome plated could be obtained. Chromium plated directly upon metals other than copper, such as brass, rustless iron and steel when subjected to a temperature of 450 deg. Fahr. for 30 min., shows a marked increase in durability against a 20 per cent calcium chloride solution spray. The tests consisted of cycles of 8 hr. in the spray followed by standing outside of the cabinet for 16 hr. without washing. "With composite layers of different metals the problem is more difficult, since when subjected to heat the hydrogen that is driven from the lower layers of metal tends to rupture the layers on top." However, Mr. Wirshing reports favorable progress in

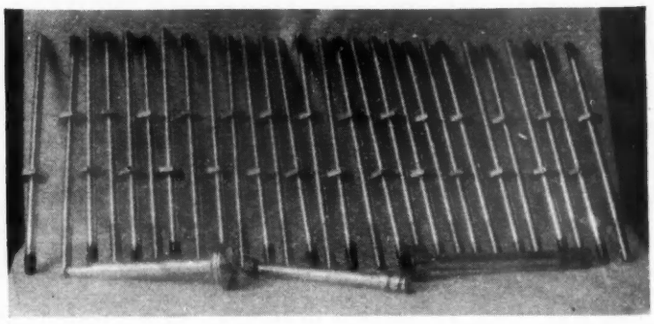


Fig. 3—Piston rods for auto washing and other pumps + + + + + + +

overcoming this problem and expects to present his results after his experiments are completed.

It is also pertinent to mention the recent work of Mr. Mougey on "Calcium Chloride Testing of Electroplated Deposits," particularly since sodium and calcium chlorides are being used on the streets and highways, the latter to lay dust in summer and both to melt ice in winter. The calcium chloride tests, while not offered as a new accelerated test of durability, is believed as good as the sodium chloride ("salt") test for this purpose. However, it is thought particularly worth applying "by the plating industry in developing chromium plates more resistant to corrosion and by the calcium chloride industry in developing calcium chloride which is less corrosive." In connection with the value of the salt spray test as a means of determining the durability of other platings, such as those of cadmium and zinc, it has been reported that results in a manner as indicated by Mr. Mougey again do not always check with natural or weathering tests, so that they may be misleading.*

## Control Methods

Of particular importance in the endeavor to produce good chromium plate, though more as it relates to the commercial plater than to the automotive manufacturer who already possesses the abilities offered by chemists and engineers with a thorough knowledge of plating principles and problems, is the fact that proper and adequate equipment for the operation of electroplating baths is becoming recognized as a desirable necessity. This applies not only to determinations of the chemical composition of solutions, but also to their temperatures and particularly to the types of meters for determining (if not continuously recording) electrical input, etc. The writer has visited several and knows of other plants wherein chrome plating is being done, yet in which control apparatus of any sort is conspicuous by its absence. It is true that not all these are plants doing automotive work, but as previously stated, they may ultimately have no small influence in affecting the status of chromium plating as a satisfactory decorative process. During the past year much has been done to correct this condition and to bring to the practical plater the meaning and importance of a thorough understanding of what is taking place when one metal is deposited upon another.

## Chromium for Hardness

The debate "Chromium Plating vs. Rustless Metals," is by no means the only development which the year has brought forth, for as thought possible in a previous article, the importance of chromium plating for hardness is being more rapidly recognized. Here again, another process that has grown in use lately in a sense is offering "competition." We are referring to nitriding. However, it is becoming increasingly evident that as the advantages and possibilities of these processes become better known, the most economic applications of each are in turn being more clearly defined.

Aside from the use of chromium plating on gages (which has been discussed previously in *Automotive Industries*), many satisfactory applications of chromium directly deposited on steel parts have been made recently. Figure 3 illustrates a group of piston rods for automobile washer pumps so coated to resist abrasion. Coatings up to 0.003 in. in thickness are being utilized on the wrist pins and other parts of the larger types of oil-injection engines, with thinner coats on injector valves, plungers, etc. Some rather spectacular work has been done in coating the inside of piston rods for large engines utilizing a method which may be applicable to coating automotive engine cylinder liners and hollow parts of similar character.

* Circular No. 80, Bureau of Standards. Also see "Outdoor Atmospheric Corrosion of Cadmium and Zinc Electrodeposited Coatings on Iron and Steel," Am. Electrochem. Soc. paper, Sept. 25, 26, 27, 1930, by C. L. Hippensteel and C. W. Borgmann.

## Recent Developments in Electroplating

**Extension of automatic and semi-automatic plating equipment.**

**Use of the plating barrel extended.**

**General recognition of value of control methods.**

**Greater standardization of plating operations as a result of more scientific knowledge of the plating process.**

**Use of better plating tanks and equipment, i.e., use of rubber lined or other tanks, acid resisting pipes, steel tubes for pickling (using inhibitors), improved facilities for handling and storing corrosive materials, etc.**

**More thorough understanding of health hazard in chrome plating and its practical elimination through proper ventilation of tanks.**

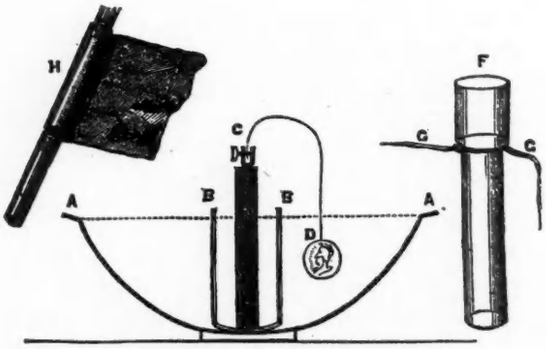
**Further use of brushed effects and satin finishes on nickel and chromium.**

**Study of coatings other than copper, nickel and chromium to determine their characteristics as possibly desirable decorative method for bright parts, and for rust resistance.**

**More thorough undertanding of necessity of proper cleaning and preparation of metal prior to plating.**

**Reduction in polishing costs through better knowledge of what the polishing operation can be expected to accomplish.**

**Successful operation of instructional courses for electroplaters, and proposed extension of educational activities.**




**Plating seventy-five years ago**

A—Basin containing the solution or sulphate of copper. B—The porous cell, containing dilute sulphuric acid. C—Amalgamated zinc rod and binding screw attached to wire and medal D. F—Porous cell made with a lamp glass closed at small end by bladder and wire support G, to prevent the membrane touching the bottom of the pan containing the solution of sulphate of copper. H—Brown paper porous cell, prepared by rolling paper of required length at least three times around a ruler, and closing the sides and bottom with sealing wax after the bottom is folded in.

## Electrodeposition of Iron

As described in *Automotive Industries,* Aug. 26, 1920, the British were the first to make practical application of the electrodeposition of iron for the purpose of reclaiming worn automobile and airplane parts. During the World War some 6000 parts such as steering knuckles, axle shafts, axle tube ends, universal joint pins, brake and clutch shaft ends where worn in brackets, speed change shafts and other pieces having a relatively high value were reclaimed, most of them of the type and size used in motor trucks. Similar work was also done in France at about the same time.

During the recent Metal Exposition at Chicago, T. P. Thomas of the Westinghouse Research Laboratories (East Pittsburgh, Pa.), presented a paper, "The Repair of Worn Parts by the Deposition of Iron," in which further development of this means of reclaiming worn parts or "rebuilding" those made too small through error was described. While the process as originally used proved satisfactory, the importance of thorough cleaning of the parts was stressed by Mr. Thomas, who also outlined the method as used in the reclamation of plug gages, reamers, pins, and in building up inside diameters such as gear hubs, etc. Further tests conducted on the electrodeposited material showed that it could be carburized and that it was readily machinable when deposited, according to the improved procedure and formula.

Any embrittlement due to the presence of hydrogen in the coating can be overcome by heating the part to 350 deg. Cent., Mr. Thomas stated in the discussion following presentation of his paper, but the presence of hydrogen did not account for hardness of the deposited surface. This he believed to be due to the growth of crystals perpendicular to the surface of the base metal as shown by microscopic examination of broken test rods. The metal can be deposited at the rate of 0.003 to 0.004 in. per hr. under the conditions given, hence the apparent simplicity and low cost of this method should warrant further consideration as a means of renewing the more costly automotive parts and particularly for reclaiming worn parts of machine tools and other heavy equipment used in automotive manufacturing operations.

## Future in Electroplating

While progress has been made in the establishment of standards for electroplating by some manufacturers, it would seem that the most important step toward the permanent acceptance of plating (with particular emphasis on chromium plating) lies in the direction of setting up of such tests as will serve to indicate the quality of plating work, followed in turn by a rigid adherence to the standards so determined. This should do more than any other single effort toward curing the "black eye" chromium plating now has in some quarters.

Not only can the buyer of equipment or accessories assist in the establishment of workable standards and purchase according to them, but he can aid in correcting any existing impressions as to the durability and permanency of chrome plate on his products through promotional effort along educational lines to dealers and others engaged in the distribution of the cars, trucks or other units on or in which chromium plated parts are used.

Chromium plating undoubtedly has its economic place in the automotive field, and this can be no more quickly established than by putting out chrome plated work that is enduring and lasting under even abnormal service conditions.

One characteristic of chromium plating is a rich luster or color which has not been equally achieved with any other metal or plate up to the present time.

---

## Bulletin of Safety Guards and Devices

A STUDY of guards and safety devices for punch presses and other metal-working machines subject to personal hazard is contained in a comprehensive booklet issued by the State of New York, Department of Labor.

This bulletin is of special interest to small, metal-working plants which may not be completely equipped with safety devices.

---

"ECONOMICAL Material Handling" is the title of an interesting 64-page book just published by The Louden Machinery Company, Fairfield, Iowa. It describes many interesting installations of conveying equipment, analyzes the problems of material handling, and discusses the selection of correct methods and equipment. The book is being mailed, on request, to executives and heads of factory departments.

# Purchase of Machine Tools Justified on the Basis of Financial Returns

**The company which fails to buy equipment when the need is evident is paying for them time and again in excessive production costs + + +**

**Formula available for establishing the fact that new tools can show a profit in savings equivalent to bond yield +**

**By Ernest F. DuBrul**
**General Manager**
**National Machine Tool Builders' Association**

Ernest F. DuBrul

FOR various reasons, unnecessary to detail here, the automotive industry is in its first real slump, and is now getting a dose of what many other industries have received often in times past. Sales income is off, and profit margins have been dwindling perhaps to the vanishing point in many cases. So for various reasons, some valid and others childish, there has been a great curtailment in the purchase of machine tools by the automotive industry.

There are only two valid reasons for such curtailment. The first is, if, as, and when the automotive plant has exactly as many or more up-to-date machine tools as are needed to make its current, low volume product at the lowest possible cost. In such cases, the purchase of additional tools would be unnecessary. But very few plants are in that ideal state of efficiency.

For plants whose equipment is not perfect only one other valid reason exists for not buying the tools they need to bring their production costs down to the minimum. That one reason is lack of cash or credit with which to finance the purchase. But companies who do not now buy profit-making tools for this valid reason are probably on their way out, so that they no longer form part of the present potential demand for machine tools.

In every plant that will continue to exist, experienced, sane production men can point to some equipment now in actual use that can be profitably replaced by something else. But the financial officers of these very same companies will not sell securities which pay, say 4 to 5 per cent, to invest these funds in machine tools that will pay from 30 per cent up on their cost.

The financial officers are so insistent in this refusal that the production men get into a most dejected state of mind. Subconsciously they get to feel that if the financial officers will not allow them to increase the present low profit margins by installing better machinery, it's no use for the production man to worry any more. That's a very bad mental state for an organization to get into, but the automotive industry seems to be getting into it to an alarming extent.

Of course, the production men are wrong in thinking that the financial men are not worrying about profits, for as the dusky denizens of "Bumminham" express it, "That's the one thing they is doing nothing else but."

# Machine Tool Profit Formula

$$\frac{\text{Cost of new machine} - \text{Salvage of old machine} - \text{Accumulated depreciation on old machine}}{\left[\dfrac{\text{Hourly cost of old machine}}{\text{Hourly production of old machine}} - \dfrac{\text{Hourly cost of new machine}}{\text{Hourly production of new machine}}\right] \times \text{Annual production}} = \text{Years required for new machine to return its additional investment.}$$

**Representation of a typical case:**

$$\frac{\$6{,}000 - \$1{,}000 - \$3{,}000}{\dfrac{\$0.80 + 2.20}{12} - \dfrac{\$0.80 + 2.50}{20} \times 25{,}000} = \frac{\$2{,}000}{\$2{,}125} = \text{Something less than one year, or, with a correction for interest, say one year.}$$

The fundamental trouble is a lack of appreciation by the financial men of just what the production men could do to increase these low profits. In many cases this is because production men have not learned how to show the financial men cold figure facts which can be proved. Given proof of a believable kind, in figures, the financial men would loosen up the purse strings, would shift investment from bonds to machines, to produce greater income.

Any good financial executive knows as well as the production man that the producing power of the company's machinery is an extremely important factor in earning profits. But he has to see the difference in profits that would be earned by substituting a newer machine for one that is already in service. Figures tell the real story to the financial mind if the figures are properly compiled, and provable. Financial men dearly love profit figures. They think and talk in figures, so the production man should learn to reduce his facts to profit-figure form. This is not as difficult as some production men seem to think it is.

## Formula Practical

Some methods for setting up such facts have been worked out. If followed intelligently these methods will put all the profit facts before a financial man in a manner that he will accept as entirely sensible. These methods are reduced to a formula. More production men ought to use this formula. They could then make a better showing for themselves and their companies than they can by any other arguments now used to get appropriations for cost reducing equipment.

Any school child of eleven or twelve can make the calculation once the production man secures the data necessary to insert in the formula given herewith.

Naturally the figures for Hourly Cost in this formula must include an allowance for interest, say at the rate the same money is earning in bonds. They must allow for insurance, taxes, repairs, rent of working space, supplies, etc., chargeable to the machines. Any cost department worth its salt can and should be able to supply those figures.

Having determined the years required for a new machine to return its individual investment over all these costs, this figure can easily be converted to a yearly rate of Profit, *in excess* of the interest being collected by the company from the securities owned. This shows how much more profitable the machine investment would be than the bond investment is.

This is a figure the financial man can understand. In many cases it will be so large that he will insist on checking it through himself, because he will think the production man made a mistake. But then he will only discover what a good production man can do to earn profits if given the machine he ought to have. He will also discover how cheap machine tools are and may hasten to authorize purchases before the builders increase their prices to a level somewhat in keeping with the savings in cost that the machines effect. Another thing which would be shown is "How much the company is paying for the needed new tools by *not* buying them."

## Paying in Costs

For the concern that does not buy machines when they need them is paying for them over and over and over. True, it is not paying the machine tool builder for them, but is paying its workmen in excessive cost. Perhaps it is paying its competitor for those tools it does not buy by allowing him to take its market, either by a lower price or by giving better quality in his car. The only way to stop such wasteful payment is to buy the machine and put it to work paying for itself which it will do over and over and over again.

Figures set out as herein suggested show the financial man both sides of this question. It shows him the "Cost of doing without a machine that the company should buy."

Show him this in figures and the production department will get the machine and be happy.

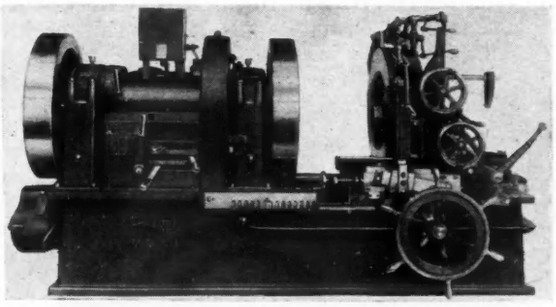
# Automotive Machine Tool and Equipment 1931 Exhibition

**In the absence of the Machine Tool and Equipment Show held at this time last year, Automotive Industries takes pleasure in offering its own display of the new tools for the coming year + + + + + + +**

## Landis Pipe Threading and Cutting Machine

THE Landis Machine Co., Inc., Waynesboro, Pa., have developed a pipe threading and cutting machine with a receding chaser, two-cut die head and lead screw attachment which will meet the requirement for long tapered threads in automotive plant maintenance and other applications.

The receding chaser feature is said to add materially to accuracy and economy. It not only makes possible the cutting of long tapered threads with narrower and, therefore, lower-priced chasers, but increases the life of the chasers between grinds. This is particularly apparent in the threading of seamless tubing.



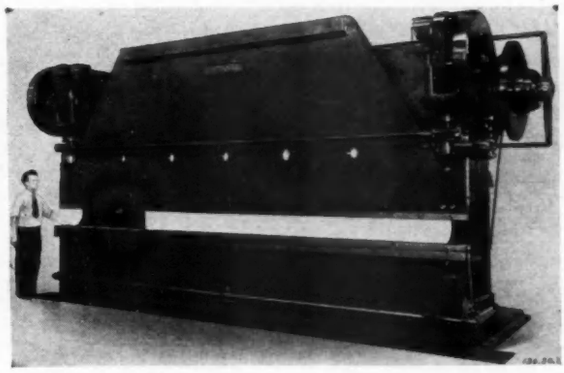
A chaser 1 15/16 in. wide is employed regardless of the thread length. This chaser has a combination turning and threading throat. The scale and surplus stock are removed by the turning section of the throat, thus relieving the remaining portion of the chaser of this heavy duty. The same chasers can be used for any pipe size within the range of the die head, so long as the pitch, taper and thread form remain constant.

The die head is a two-cut head which perimts of roughing and finishing without change in diametrical adjustment. Both the roughing and finishing cuts are controlled by the one taper mechanism, while an independent adjustment of the chaser holders to and from the center insures an equal distribution of the cut. The adjustment for size is universal. In addition, there is a universal micrometer adjustment for gage fits. Each graduation on the micrometer dial gives a variation of 0.001 in. in diameter.

## Cincinnati Shaper 18 Ft. Press Brake

AN unusually long press brake with a capacity to form, without overload, right angles in 3/16 in. steel, 16 ft. long, over 1½ in. die to a 3/16 in. inside radius was recently built by the Cincinnati Shaper Co., Cincinnati, Ohio. It has an overall die surface of 18 ft. with 16½ ft. between the housings. All the main members are made of rolled steel plates.

The design incorporates two noteworthy features: First, cylindrical or spherical bearings throughout between load-carrying members, particularly the saddle to the ram and the mounting of the bed to the housings. This construction does away with all sharp corners as a source of weakness and allows full and unrestrained action of every member. Second, all loads are transmitted directly up the center

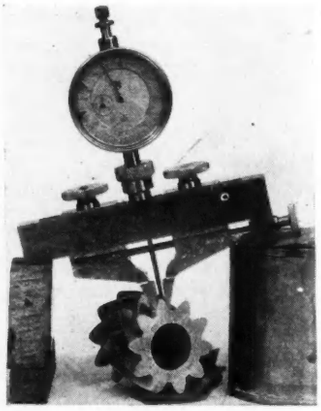


line of both housings, which eliminates distortion from eccentric loads.

The adjustment to the ram is motorized; the drive is multiple "V" belt to the flywheel; all bearings are either anti-friction or bronze bushed; ram guides are gibbed in both directions; lubrication is fully automatic.

## Improved Model E Sykes Gear Tooth Comparator

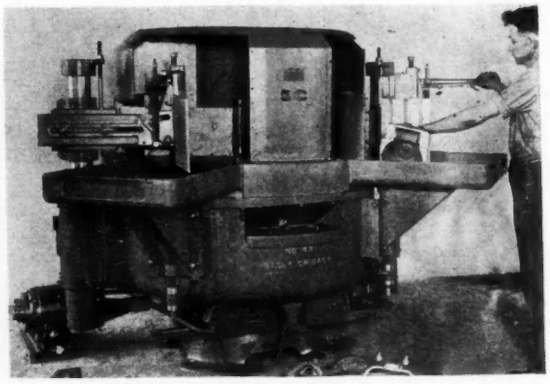
THE Model E geartooth comparator with important improvements in design has been placed on the market by the Farrel-Brimingham Co., Inc., Buffalo, N. Y. It is adaptable for precision gaging of tooth parts for any type of gear.



Chief improvements are found in the features of making both jaws movable and replaceable so that the instrument can be supplied with interchangeable jaws of different pressure angle. Another feature is the vertical adjustment of the indicator dial gage which permits quick changes in the indicator spindle with facility.

## Besly No. 49-53 in. Wet and Dry Grinder

THIS machine, designed for wet or dry grinding, was announced recently by Charles H. Besly & Co., Chicago, Ill. It is of the direct motor-driven type, having a 40 hp. 220 or 440 V., 3-Phase, 60-Cycle, 450 R.P.M. A.C. Motor, with automatic starter and push button control. The spindle is mounted on two radials and one thrust bearing.



The two-geared lever feed tables (No. 16) are mounted on vertical shafts 4½ in. diameter and are operated by means of 2 motor-driven worm gear reduction drives connected to the vertical shaft by steel connecting rods. The oscillating fixture is driven by 1½ hp. 220 or 440 V., 3-Phase, 60-Cycle A.C. Motor. Water is supplied to the machine by 1¼ in. Fulflo motor driven pump unit with 1 hp. 1800 R.P.M., 220 or 440 V., 3-Phase, 60-Cycle A.C. Motor. The geared lever feed tables have a special spring feed and lock out arrangement so that the operator can take care of both tables.

For wet grinding the machine is equipped with suitable water hoods reducing the splash to a minimum. Each station is provided with an adjustable loading platen for the purpose of chucking work in the fixture. The steel disk wheel is drilled and tapped for steelbac abrasive disks. For dry grinding, the breeching to the exhaust system is attached to the opening at the rear of machine. The front opening will be sealed with felt strips. The cover can be removed at any time for the purpose of cleaning out the heavier particles that were not removed by the exhaust.

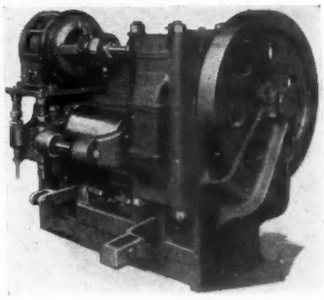
## Clipper Speed Lacer

WHAT is said to be one of the most powerful belt lacers ever built is the Clipper Speed Lacer No. 8, manufactured by the Clipper Belt Lacer Co., Grand Rapids, Mich. This machine will lace a belt 8 in. wide in one operation.

Their Clipper No. Speed Lacer is a smaller unit which will handle belts from 1 in. to 6 in. wide.

## Erie Motor Driven Board Drop Hammer

TYPE M Erie board drop hammers, built by the Erie Foundry Co., Erie, Pa., are available in a complete range of sizes from 1000 to 4000 lb. Their outstanding feature is the Type M head illustrated here.



The chief advantages claimed for this unit type head are as follows: both rolls are driven by one motor so that roll speeds are always identical and no synchronizing mechanism is necessary; end

thrust as well as radial loads are taken on anti-friction bearings; no chains, belts or sprockets are required and all the gearing is completely inclosed in an oil-tight gear case.

Increased production is expected, due to the quicker lift of the hammer and the possibility of increasing the number of blows.

## Super-Johnson Clutch for Automotive Machinery

SIMPLIFIED clutch construction, compactness, (one size as small as 3 3/16 in. outside diameter) quietness, cleanliness, safety, these are the features of the Super-Johnson Clutch recently modernized by The Carlyle Johnson Machine Company, Manchester, Conn.

Working parts of chrome nickel steel add to the strength, reliability and life of this Super-Clutch and in addition there is a locking device in the adjustment which holds it secure.

Two additional features where circumstances demand or the customer requests same are: Installation of the Alemite System of Lubrication and lining the outside diameter of the expansion friction ring with a special lining, especially when there is high speed or an extra heavy pick-up load, or both, causing an unusual degree of slipping of the clutch when engaging same.

## Hall Model P Production Hone and Model SP for Limited Production

THE current line of production hones, made by the Hall Manufacturing Co., Toledo, Ohio, comprises a full range of sizes from 1¼ in. to 20 in. diameter. The operation of the Model P hone is given below.

The expanding lever, when pressed down to the collapsed position, acts as a cam, raising the collar above the lever cam which in turn is fastened to the long inner shaft which travels down through the center tube. This inner shaft is attached in turn to the double cone expanding shaft. It is also attached to a plate ring upon which an expanding spring acts.

To apply pressure, the lever handle is placed in the upward position. This allows the expansion spring to expand downward, forcing the double coned shaft down and pressing the small taper pins outward against the stone carriers. This outward expansion is controlled by the plate ring upon which the spring acts. Spring pressure remains constant regardless of stone wear or expanded diameter. It is predetermined and can only be changed by replacing the spring.

To set the hone for a cylinder, drop it into cylinder and simply turn the micrometer graduating nut until the hone is tight against cylinder wall. Run the hone under a flow of kerosene until it has stopped cutting, check size and continue to expand the hone until the desired diameter has been obtained.

The Model SP hone is designed for use in limited production or where speed is not essential. It is identical in design with the Model P hone, except that the trip lever is replaced by a single hand nut which contracts or expands the hone with a quarter turn. This is suitable for small production on single spindle jobs. A full ball joint connects the driving tube to the hone.



## Murchey Precision Threading Machine

FAST, accurate, threading is said to be produced uniformly and economically on the new No. 98 precision threading machine recently placed on the market by the Murchey Machine & Tool Co., Detroit, Mich.

Accuracy within 0.0001 in. per inch of lead is said to be possible through the use of a hardened and ground lead screw mounted directly on the spindle.

The segmental lead nuts, which, in connection with the hardened and ground lead screw, control this machine, open and close in a manner similar to the way in which chasers open and close in a self-opening die head. When required, these lead nuts may be removed and the machine operated manually.

This machine is equipped with two driving motors; the main machine drive is by means of a 3 hp., 1800 r.p.m. motor, while the pumps and the return worm shaft are driven by a ¼ hp., 1800 r.p.m. motor.

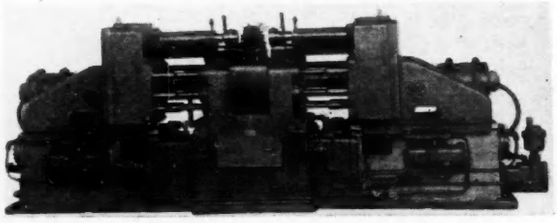
## Natco Two-Way Horizontal Hydraulic Machine

HERE is a Two-Way Horizontal Hydraulic machine arranged for boring, counterboring, facing, hollow milling and threading cast iron shock absorber bodies recently delivered by The National Automatic Tool Co., Richmond, Ind. It is built of two standard Natco hydraulic units: a center pedestal and a five-position, trunnion-type fixture arranged for holding two pieces in each position. The Natco Hydro

Automotive

# Machine Tool and Equipment

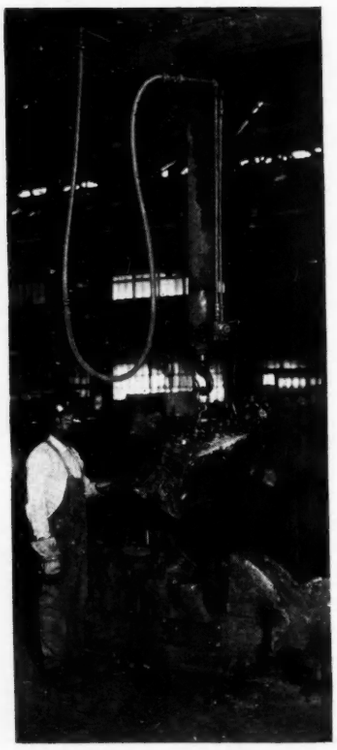
1931 Exhibition



Uni-power system of hydraulic feed is used. It is semi-automatic in operation, the operator controlling each head by a separate air valve.

## Curtis Air Hoist

ONE of the line of Curtis' air hoists, made by the Curtis Pneumatic Machinery Co., St. Louis, Mo., is shown in action in the gray-iron foundry of one of the large automobile manufacturers. This particular unit is used for lifting and closing flasks, shaking out castings and similar work.



Among the features claimed for the air hoist are accuracy of spotting, since exact control is possible; gentle handling without jerk or jar, and the ability to provide horizontal motion such as pushing or pulling heavy loads into or out of various positions.

## Barnes All-Geared Drilling and Tapping Machine

DESIGNED with a capacity of 1 in. high-speed twist drill in mild steel, the new No. S201 drilling and tapping machine recently introduced by the Barnes Drill Co., Rockford, Ill., is a high production, single purpose unit. It has a 20-in. swing and is provided with quick kick-off gears for any single speed from 700 to 1200 r.p.m.

The spindle is of high carbon forging steel made with six splines to eliminate keying. For tapping operations a reversing, multiple-disk clutch gear is added. This machine is provided with a patented system of spur geared feeds so arranged that power feed may be engaged or disengaged while the spindle is running.

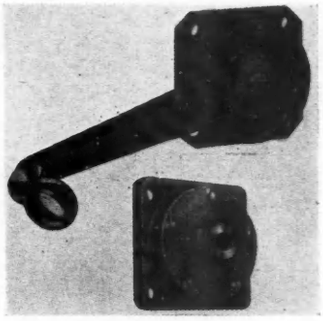
## Westcott Adds New Chucks to Line

WESTCOTT CHUCK CO., Oneida, N. Y., announces that they have recently perfected a new line of bevel geared universal lathe chucks. Among the features of these chucks are: One-piece bodies, steel forgings to be used in the smaller sizes and semi-steel castings in the larger sizes; jaws, scrolls, and pinions of specially selected steel. An entirely new method of holding the pinions has been devised so that no retaining screw or plug is visible.

All styles of jaws are furnished, including the one-piece jaws for inside and outside chucking and the reversible two-piece jaws.

## Siewek Positive Action Fixture Lock

NINE sizes, right or left-hand style, feature the line of positive action fixture locks built by the Siewek Tool Co., Detroit, Mich. Among the many possible applications are the following: for drilling fixtures, water test fixtures, indexing fixture tumble jigs, die casting machines, body clamps and for actuating machine spindles.



## Barnes Self-Oiling Drilling and Tapping Machine

SIX quick-change high geared speeds and a patented system of six quick spur gear feed changes readily available by shifting conveniently located levers feature the new style No. 201 drilling and tapping machine just placed on the market by the Barnes Drill Co., Rockford, Ill. This machine has a capacity of 1 in. in mild steel and a 20-in. swing. It is a smaller model of their present heavy-duty No. 221½ and No. 242 machines.

As on their other machines, the head is an integral unit containing all the working parts including the pump for the self-oiling system and the cooling pump. These heads may be

used in gang style for two or six spindles. These may be engaged or disengaged when the spindle is running idle and the operating levers are extended to the front for ease of control.

For tapping operations a reversing multiple disk clutch and two spiral bevel gears are added. A depth stop is also provided for reversing automatically at any desired depth according to the setting.

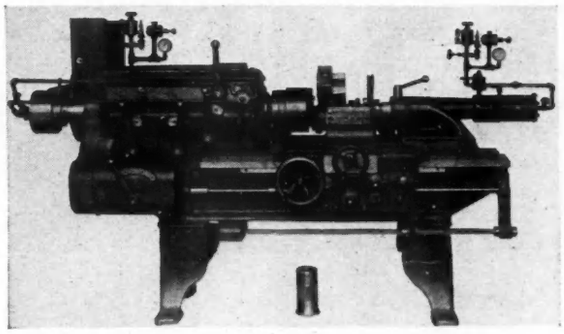
## Semi-Automatic Welder Adaptable for Shielded Arc

AN improved portable, semi-automatic arc welding equipment for either open or shielded arc welding was publicly exhibited by the General Electric Co., Schenectady, N. Y., for the first time at the National Metals Exposition in Chicago.

The equipment consists of a welding head for feeding the electrode, an inclosed line contactor with interlock and a field rheostat for controlling the motor on the welding head, as well as a welding tool and lead for directing the electrode toward the work. The welding head is simply a motor-driven wire feeding device to supply electrode wire continuously to the arc. The wire is drawn from a reel by means of a pair of geared feed rollers propelled through a train of gears by an adjustable speed, 60-volt d.-c. motor. The head is equipped with a gear shift for obtaining approximately the required rate of wire speed, the final adjustment being made by means of the motor field rheostat.

## Monarch Model "H" Lathe Has Special Headstock

THE Monarch Machine Tool Co., Sidney, Ohio, has developed a special 20 in. x 6 ft. Model "H" lathe. Its eight-speed Model "L" helical geared



Timkenized headstock is arranged for a single pulley drive, or direct motor drive.

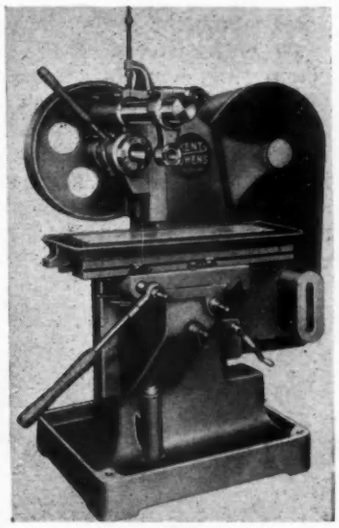
In this particular setup the lathe is equipped with a special three-jaw Logansport air chuck and an air cylinder for operating the tailstock spindle. In addition, it has an anti-friction bearing cone tailstock center and back arm facing attachment for facing the cylinder, which is shown beneath the lathe. There are three tungsten carbide turning tools in the front tool rest and one in the rear facing rest.

The weight of this machine without the motor is approximately 4600 lb. (crated). Floor space is 124 in. long, 48 in. wide and 71 high. Capacity of the driving motor for this machine ranges from 7½ to 10 hp. This new lathe will accept 52¾ in. between centers, will swing 11 in. over the cross-slide and 20 in. over the carriage wing.



## Variable Speed Drive on Kent-Owens Miller No. 2

POSSESSING essentially the same features as the No. 1 miller described in the issue of June 21, 1930, the No. 2 miller recently announced by the Kent-Owens Machine Co., Toledo, Ohio, is designed for heavy-duty production and jobbing work. The variable speed drive is exactly the same except that an idler pulley has been added.



This machine has a continuous range of spindle speeds from 100 to 1200 r.p.m. with a 1200 r.p.m. motor. Recommended motor size 3 to 5 hp.; speed range up to 1200 r.p.m.

## Tuthill Model H Series High-Pressure Oil Pump

RECENT developments in equipment suitable for hydraulic transmission of power include the series of Model H high-pressure oil pumps introduced by the Tuthill Pump Co., Chicago, Ill. These pumps are offered for hydraulic feeds, accumulator tank service and the hydraulic operation of various mechanisms.

They are built in four sizes, ranging in capacity from 10 g.p.m. to 40 g.p.m. against pressures up to 1000 lb. per sq. in. when pumping liquids with good lubricating qualities. A fifth size to furnish 100 g.p.m. for pressures not exceeding 500 lb. per sq. in. is also available upon order.

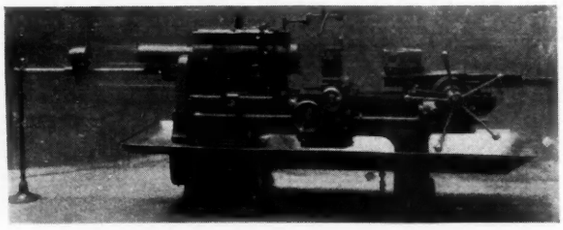
Special operating features include the ability

to drive the pump at direct motor speeds up to 1200 r.p.m., and flexibility in mounting through special pipe flange for both discharge and intake ports to eliminate extra pipe joints and permit use of manifod suited to each installation.

## Gisholt Universal Ram Type Turret Lathe

PROVIDED with a turret that is clamped and unclamped automatically, thereby saving operating time and effort and maintaining accuracy of the machine and work, a universal ram-type turret lathe is announced by the Gisholt Machine Co., Madison, Wis. A bevel clamp ring, operated by an eccentric toggle, is opened and closed about the base of the turret by the backward and forward movement of the turret slide.

As entire stress of the cut is taken by the clamp ring, none is transmitted to the locating bushings. The positive lock of the hardened steel gib keeps the turret slide in exact alignment. The turret stop roll permits adjustment to 0.005 in. between the automatic feed trip and dead stop. This close adjustment between the automatic feed trip and dead stop reduces manual effort and operating time.



Another feature is that a single lever controls the starting, stopping and reversing of the spindle through multiple-disk clutches and brake. Twelve spindle speeds, 28 to 751 r.p.m., are obtained selectively. The brake is applied automatically at the neutral position of the control lever and a special safety latch prevents starting the spindle accidentally. Tapered roller bearings on the spindle and the driveshafts is another feature. Lubrication of all bearings and gears in the headstock is by means of splash lubrication. Drive is taken from a motor mounted in the cabinet leg, through Texrope belts to a balanced driving pulley on the headstock, thus assuring smoothness in operation of the machine.

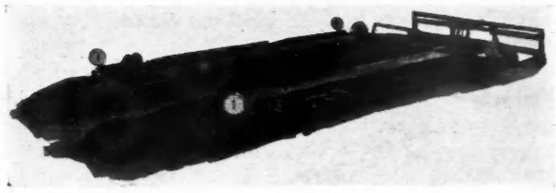
Hardened steel ways on the bed and in the turret saddle preserve the accurate alignment. Eight selective feeds in each apron range from 0.002 in. to 0.067 in. All apron parts run in oil. A hand pump, located in the cross-slide apron, lubricates the bedways, cross-slide and cross-feed screws; another in the turret apron lubricates the saddleways and turnstile shaft.

This machine is built in two sizes, the No. 3 with 1½ x 10-in. bar capacity and 18½-in. swing over the ways, and the No. 4 with bar capacity of 2 x 14 in. and swing over the ways of 19¾ in.

## Intermediate Size Cowdrey Brake Tester

AN intermediate size Cowdrey brake tester equipped with 1½ hp. motors has been placed on the market by the Bendix-Cowdrey Brake Tester, Inc., South Bend, Ind. This new model has rolls 30 in. long to accommodate dual tires. The maximum permissible scale reading at each wheel is 4500 lb. and maximum vehicle weight, 18,000 lb.

Two types are offered, one for two-wheel test-

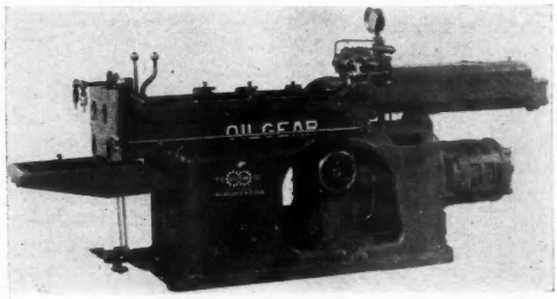


ing; the other for four-wheel testing. The four-wheel type is automatically self-adjustable for wheelbase ranging between 100 and 227 in. Both machines are of the drive-on and back-off type.

## Oilgear Twin Twelve Broaching Machine

THE Oilgear Co., Milwaukee, Wis., announces the new "Twin Twelve" horizontal broaching machine which differs considerably in construction from the "Twin Ten" broaching machine which it supersedes. Sturdy construction, convenient control, higher pulling and return speeds and closer limits for finished parts have been the keynote of this broaching machine design. The "Twin Twelve Broaching Machine" is adapted for high speed broaching of small and medium size parts, especially those used in the automotive and aeroplane industry.

The power unit consists of an Oilgear type "WG-6" variable delivery pump which is mounted



in the frame as an integral part of the machine. The efficiency of the Oilgear pump at full stroke and load is 90 per cent. The Oilgear multiple plunger pump delivers a smooth and pulsationless flow of oil under pressure in direct proportion to the pull required for broaching and oil displacement is practically positive against any resistance up to the maximum capacity. The pump, broaching machine, work and tools are protected against overload by automatically operated relief and by-pass valves. A convenient hand wheel mounted on the pump controls the amount of oil delivered and the speed of the draw heads.

This machine can be equipped with a simple manually operated control or a combined control for automatic or manual operation. The broach control is conveniently located and allows the operator's hands to be free to serve the machine.

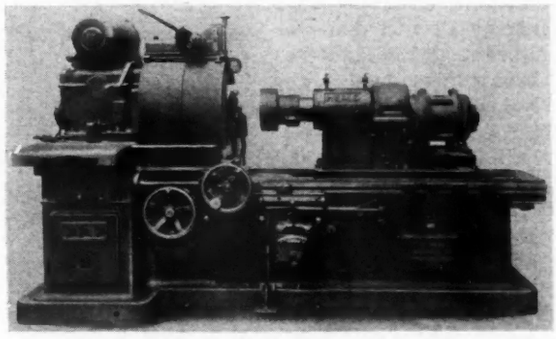
The general specifications are: Normal pulling capacity 12,000 lb., peak pulling capacity 15,000 lb., stroke adjustable from 6 in. to 36 in. and the pulling speed adjustable from 48 in. to 396 in. per minute. Net weight of the motor-driven machine is about 4800 lb. Motor drive is by a 10 hp. motor at 860 r.p.m. Floor space 32 x 120 in. overall.

## Heald Heavy Duty Internal Grinding Machine

DESIGNED primarily for the rapid removal of large amounts of stock with fine finish and close accuracy on big work, the Heald No. 77 heavy-duty internal grinding machine—the largest chucking internal built—has been placed on the market by The Heald Machine Co., Worcester, Mass. It is particularly recommended for rapidly hogging out metal from large gears, bearing races, rolls, pipes, sheaves, etc., and then finishing the piece to close limits. It will grind straight or taper bores with equal facility and face grind without changing the setup.

Spindle speeds varying from 35 to 140 r.p.m. are available through use of the adjustable speed motor which is mounted on the cover of the spindle housing. The flange of spindle is of generous proportions to assure an adequately large and substantial anchorage for the work fixtures.

An idea of the ruggedness and power of the machine is to be had from the fact that it is driven by three motors, totaling 31 hp.; one for the wheelhead, one for rotating the work, and one for driving the pump of the hydraulic system. The use of three motors affords direct, efficient drives to these units and eliminates costly transmissions, gearing, belts, pulleys, drums, countershafts, etc., as well as the cost of power dissipated by the frictional drag of such mechanisms. Attention is called to the fact that only one belt is used in the entire machine and that is a 7-in. endless belt for the wheelhead to assure an absolutely vibrationless transmission of power to the spindle.



The base of this machine is a 4-ton massive, one-piece, box type casting, heavily ribbed for rigidity. It is cast of fine grain gray iron having a 20 per cent steel content for additional strength.

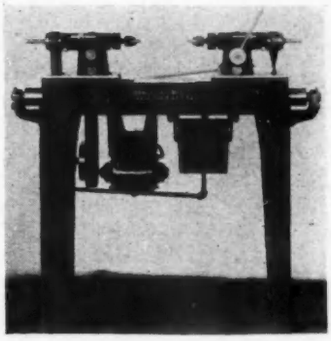
The oil reservoir for the hydraulic system is cast in the base, aiding materially in keeping the oil free from foreign substances and also adding rigidity and weight to the base.

The main table, weighing over a ton, travels on large flat and V ways which are lubricated by a pressure feed system guaranteeing a positive supply of oil to give long life and insure a continued accuracy of operation.

Maximum travel of table is 36 in.; length and width of base on floor, 116 in. x 46½ in.; floor space (total), 123 in. x 78 in.; net weight, 18,000 lb.; total horsepower (three motor), 31 hp.

## Langelier Horizontal Duplex Drilling Machine

THE Langelier Manufacturing Co., Providence, R. I., has recently added to its line a new horizontal duplex drilling machine having a capacity for driving drills up to ⅜ in. in steel; the distance from center of spindles to the table is 6⅜ in. The drilling heads can be adjusted to a working position from 3 in. minimum to 16 in. maximum between chuck ends.



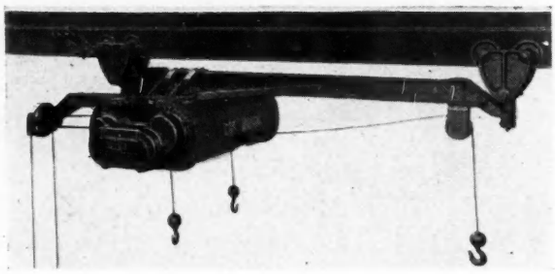
The drilling spindles are mounted in feed sleeves which have a sliding fit in the drilling heads. They can be arranged to run at speeds from 1200 r.p.m. to 6000 r.p.m. to suit customer's requirements. Adjustable stops are provided

on the feed sleeve for drilling to the required depth. Spindles are equipped with No. 2A Jacobs Chucks and are driven by ball-bearing pulleys mounted on sleeve trunnions clamped into the outer end of feed sleeve bores in the drilling heads. The pulleys carry driving collars which have two keys engaging the splines in the driving end of the drilling spindles. The drilling feed for both heads is operated simultaneously by means of a connecting rod and levers that are mounted on the ends of pinion shafts in the drilling heads.

The machine occupies a floor space of 50 in. by 22 in. and weighs approximately 525 lb.

## American Three-Hook Lo-Hed Body Hoist

THE illustration shows a Lo-Hed hoist recently designed for use in the plant of a large body manufacturer and is one of many installations made by the American Engineering Co., Philadelphia, Pa. This hoist is equipped with three



hooks arranged to give a uniform hoisting speed and a uniformly distributed hoisting effort at all points on the body.

## Jarvis Screw Driver and Nut Setter

ASSEMBLING nuts and screws is said to be greatly facilitated by the improved Jarvis screw driver and nut setter (Niedhammer patent) which operates on the hammer blow principle. It may be used as a flexible shaft unit; with any standard drilling machine as an attachment for screw and nut driving, and with any standard electric or air drill runner.

Three balls are provided to permit adjustment for friction by simply tightening down the top collar. As a screw or nut is tightened into place and the power required increases, the pressure of the spring is overcome to such an extent that the balls withdraw from their sockets and move in a path around the flange of the nosepiece. These balls tend to reseat themselves in the pockets as they pass over, and this results in a rapid succession of light hammer blows which drive the nut or screw in place.

## Rockford Shows Three Interesting Machines

FLEXIBILITY and adaptability to similar parts on high production set-ups are strikingly shown in the three new machines recently built by the Rockford Drilling Machine Co., Rockford, Ill. These examples are illustrative of the varied line of unit machines and special fixtures built by this company.

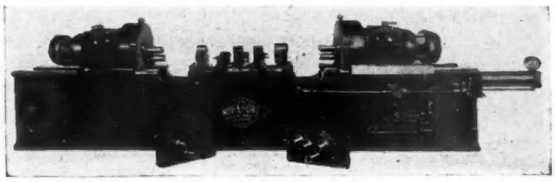
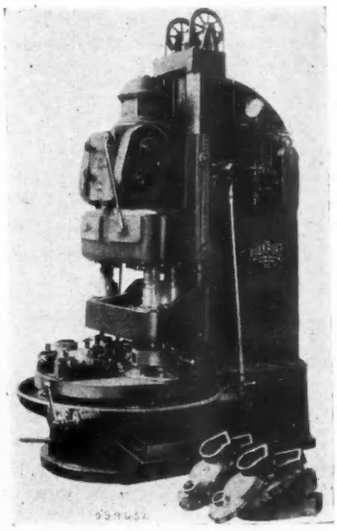


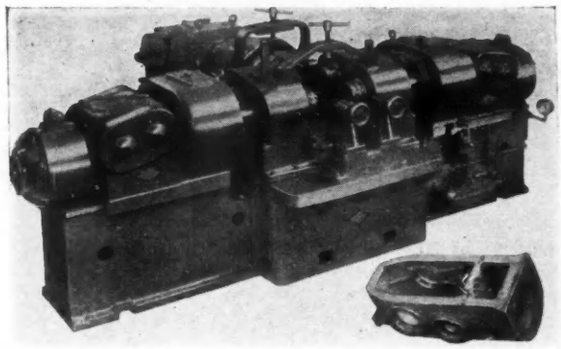
Fig. 1 illustrates a Double-End Horizontal Machine with fixture in place for core drilling crank and cam lines in automotive crankcases. With the machine arranged as shown the user core drills one type of crankcase on a high production basis. Then by replacing the spindle units now shown on machine with the extra spindle units shown setting on the floor, also changing fixtures, the machine is equipped to core drill another type of crankcase on a high production basis. Note that one of the extra spindle units has four spindles. The extra two spindles are for machining accessory lines in the second crankcase.

Fig. 2 illustrates a vertical arrangement of a Rockford machine having a three-station indexing table for progressive operations on a large tractor gear case housing. Unloading and loading takes place at the first table stations, while at the second station there is a part previously loaded having the hole through hub bored, the hub rough-turned, faced and counterbored. At the third station the hole in hub first worked on is finish-bored and turned, and in addition, the large hole at



other end of case is rough and finish-bored. At each index of the table a gear case housing is secured with all the above operations completed.

Fig. 3 is a heavy-duty three-way horizontal arrangement for boring the massive tractor transmission case shown, on a high production basis. This machine rough and finish-bores the two cross-holes on each side of the case, one of which is 7½ in. in diameter and the other 9 in. in diameter, while the third way of the machine rough and finish-bores the large end hole, which is 13⅞ in. in diameter. All holes are bored simul-



taneously, and both rough and finish-boring operations are done in one pass of machine heads.

The general constructional features of all three machines are the same. A motor drives directly into each machine drive head proper through two sets of worms and worm gears for reduction, also through spur pick-off gears at sides of head which are readily accessible and permit speed changes. Machines can be arranged so that the heads will deliver two different speeds by merely shifting the lever located on top of head from one side to the other.

Feed on Rockford drilling and boring machines is secured through the Oilgear pump in conjunction with cylinders. This Oilgear pump is driven by a separate motor. In some cases only one pump is used to operate several machine heads simultaneously, or where certain operations make it necessary, a separate Oilgear pump is used to operate each individual machine head. In the case of the machine in Fig. 1, the operator engages the control lever, after which both heads rapid traverse forward simultaneously to point where core drills are about to start working, slow down to proper feeding rate, and when feed has advanced to a predetermined point both heads automatically rapid traverse to the rear or starting position and stop. In order to secure the greatest amount of production, the automatic control is so arranged that the heads rapid traverse the core drills between each set of bearings, thus eliminating the necessity to feed at a slow rate across the gap from one bearing to the other.

In the machine shown in Fig. 2, after control has been engaged the automatic operation cycle consists of rapid traverse of machine head down to point where tools are about to start working, automatically engages proper feeding rate, feeds to a predetermined point, automatically slows down again to a finer feed for facing, dwells for a short space of time against a positive stop to secure facing operation, then automatically rapid return traverses to the stop or starting position.

The automatic operation cycle in the case of the machine in Fig. 3 consists of heads rapid traversing forward, engagement of feed at proper point, feed a predetermined distance, and then automatically rapid traverse to the rear or starting position and stop, ready for another cycle to be engaged.

## Federal Dial Thickness Gage

FLAT materials of any type within the range of 0.100 in. spindle travel may be accurately inspected with the Model 90 dial thickness gage which has just been added by the Federal Products Corp., Providence, R. I. This gage is similar to their present line but is graduated in 0.0001 in. to meet the requirements of greater precision. Scale divisions are of the same size as for graduations of 0.001 on their ordinary dial indicator. It is available with plain or jewel movement and with hardened and ground anvils either flat or ball-pointed as required.

Spring tension can be altered to suit individual needs. The spindle is raised by pressing down on the small lever at the top.

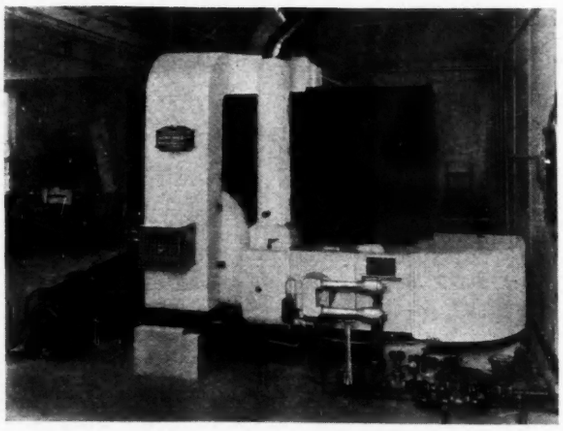
## Dry-Sys Gas Fired Compact Heater

RECOGNIZING that gas is becoming more and more popular as fuel for industrial processes requiring heat, Drying Systems, Inc., Chicago, Ill., has added to its extensive line of gas and oil-fired external heaters the DRY-SYS gas-fired compact heater. As with all of this company's

equipment, this heater is designed for heating industrial ovens, dryers, lehrs and bakers.

The compact heater is designed on basic principles covering the recirculation of diluted products of combustion in drying or baking problems and will operate either as a "Push-Through," or "Pull-Through" heater. On "Push-Through" installations the circulating fan is located at the inlet end of the heater where it handles either cold air, or, in the case of recirculation, air of considerably lower temperature than the heated mixture delivered to the oven or dryer. The cooler air, passing through the heater at high velocity, induces and thoroughly dilutes the products of combustion from the gas burners for delivery to the oven or dryer at the desired temperature.

On "Pull-Through" heaters, the fan is located at the outlet end of the heater so as to pull the products of combustion which consists of fresh

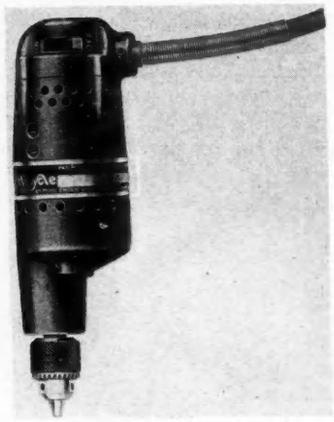


air from the outside and recirculated air from the oven through the heater and fan for delivery back to the oven at desired temperature.

The simplest gas burner is of the atmospheric type and for this reason the burner front is designed to accommodate this type. But, where it is desired, high or low pressure inspirator type burners may be installed by making a few minor changes. This heater with the automatic controls furnished by Drying Systems, Inc., is said to answer the requirements of all underwriters.

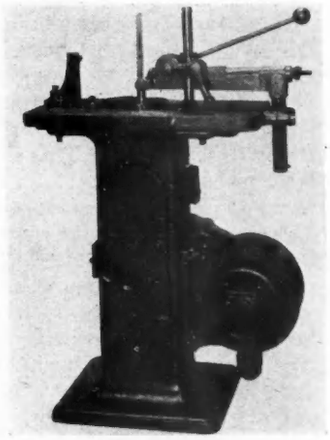
## Hicycle Portable Electric Tools

FIVE additions to the Hicycle line, the Nos. 12 and 13 drills, Nos. 12N and 13N screw drivers, and the No. 12G die grinder, intended for aircraft and light metal work, were recently made by the Chicago Pneumatic Tool Co., New York. The No. 12 drill illustrated here is typical of the general appearance and size of these new tools. The drills have a capacity up to 3/16 diameter in metal; weigh about 4 lb., and are about 10 in. long overall. The screw drivers have a capacity of No. 6 and No. 8 screws; weigh 5 lb., and are about 10 in. long. The die grinder weighs 4¼ lb., and is 11 in. long with the external wheel which is 2 x ⅜ in.



## Davis Keyseater for Motor Drive

THE "Davis" keyseater, made by the Davis Keyseater Co., Rochester, N. Y., is now furnished with motor drive by pinion as shown. It is fitted with a 2 hp. motor having a speed of approximately 1200 r.p.m. and is driven by a pinion with an intermediate gear running idle between the pinion and the gear on the operating shaft of the machine.



The crosshead is fitted with a cutter holder having a pin to which the bottom shank of cutter is attached, the pin block being adjustable laterally so that it may be quickly lined up for the use of cutters of various thicknesses. The form of cutter used is that of a saw or broach having a number of teeth cutting at one time. This form of cutter is said to make it impossible for it to dig into the work.

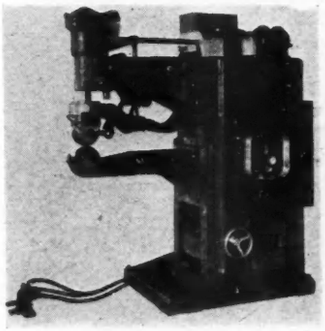
The blank to be cut is mounted on a bushing turned to fit the bore of the work and carrying a vertical slot which acts as a guide for the cutter which passes through this bushing. The cutter is fed into the work by means of a rack and pinion carried in the clamping down

arm, the rack piece having a direct bearing against the back edge of the cutter, and the pinion feeding this rack against the cutter is operated by means of a hand lever so that only slight pressure by the operator is required to force the cutter into the work on the down stroke.

The machine illustrated is suitable for cutting all sizes of keyways from 1/16 in. up to 5/8 in. in width; other sizes are available for wider keyways.

## Thomson-Gibb No. 4 HDA Seam Welder

A SEAM welder with a capacity of welding leak-proof seams of two thicknesses of No. 14 gage at 6 ft. per minute was shown for the first time at the National Metal Exposition by the Thomson-Gibb Electric Welding Co., Bay City, Mich. This No. 4 HDA machine provides four welding speeds by means of a special motor-driven four-speed gearbox.



An important feature of this machine is that the driving mechanism is made up of independent units to permit housing them for lubrication purposes and for ready removal in the event that maintenance is required. Although the driving welding roll is of necessity a slow revolving member, the shaft and gear driving this roll revolve at a moderately high speed. All parts of the machine subjected to welding heat are now more adequately cooled by independent circuits of circulating water.

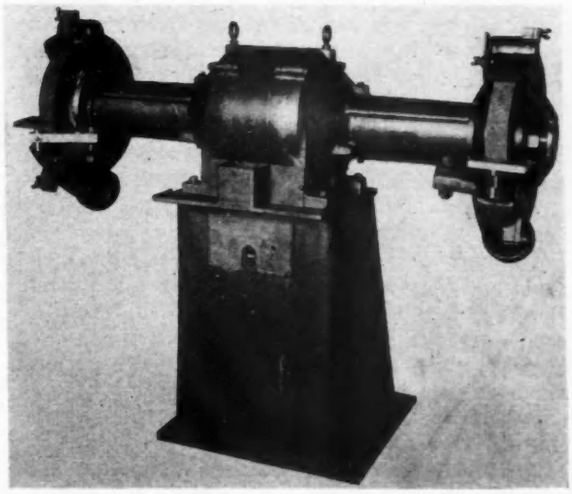
A three-speed chain gearbox for the interrupter speed is arranged so that the number of interruptions per inch of weld can be changed when desired. The drive is so arranged that welding speeds can be changed without altering the number of current interruptions per inch.

## Heavy Duty Wide Grinders

THE Production Equipment Co., Cleveland, Ohio, announce the completion of factory and field tests on their heavy duty type Extended Spindle Grinding Machine. This grinder is particularly adapted for parts or pieces of metal that, due to their size, shape or design, cannot ordinarily be successfully ground on standard machines.

Four heavy duty ball bearings, two in each



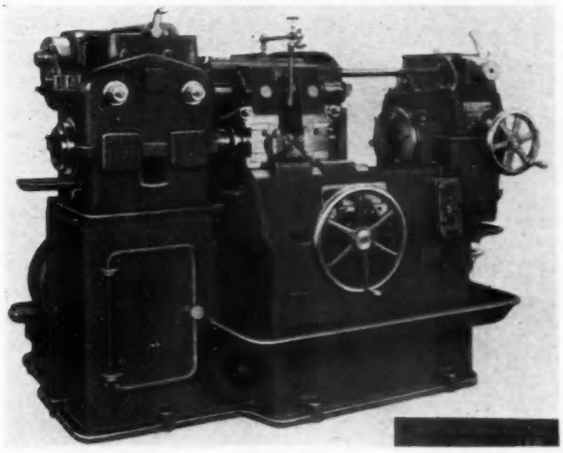


extended arm, provide strength and rigidity to the nickel steel spindles. The greatest part of this grinder, especially base and accessories, is constructed from steel shapes, formed and welded.

With 3 to 5 hp. electric motor drive, the base is 23 x 29 in.; with 7½ hp. and up, the base is 26 x 28 in. Overall width from 51 to 71 in. approximately.

## Sykes Gear Generator for Cluster Work

THE Model 1A, a new Sykes gear generator, designed for the automotive industry, is introduced by the Farrel-Birmingham Co., Inc., Buffalo, N. Y. It has a diameter range of 1¼ in.



to 12 in. and will cut all pitches from 24 DP up to and including 4 DP, for herringbone, straight spur and single helical teeth. The principal feature of this machine is its high speed, the number of stroke per minute being 850. Another feature claimed by the manufacturers is the high degree of precision.

Another valuable feature is that it cuts both gears of a cluster combination simultaneously. Both gears of such a pair can be cut at one operation and the machine handles them equally well, whether the pitches are the same or different on each gear. It is also adapted for cutting gangs of gears, as it is designed to utilize two cutters, mounted face to face, so that one cutter cuts on one direction of the stroke and the other on the opposite direction.

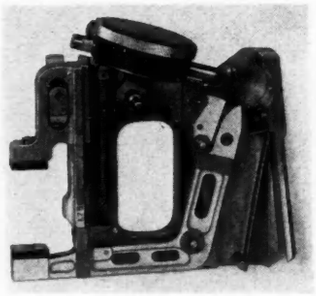
A wide range of work may be mounted. Pinions having long shafts, or combination gears of the cluster variety, in addition to spline shafts, are said to be easily handled. Gears integral with crankshafts can be cut, and the machine is further adapted for generating cams and other irregular shapes.

Standard cutters are 4-in. diameter, but cutters up to 6-in. diameter may be used. Although the machine is listed for a maximum pitch of 4 DP, it will cut 3 DP when cutters of a diameter larger than 4 in. are used.

Floor space required is 72 x 55 in. Shipping weight is 7500 lb.

## Model MBH Comtorgage High Geared Type

A NEW comparator type gage for rapid precision gaging in automotive inspection has been added by the Comtor Co., Waltham, Mass. Comtorgage MBH is graduated to 0.0001 of an inch and is claimed to have an inherent accuracy within plus or minus 0.00005 in.



These instruments have a high initial amplification by levers making it possible to use a low geared dial gage graduated to 0.0001 in. The use of levers for the first step of amplification is said to divide, or practically eliminate, the errors involved in a gearing arrangement. One of the best applications of the new comtorgages is said to be for gaging revolving work in external cylindrical grinding operations where it is used while the grinding operation is in progress.

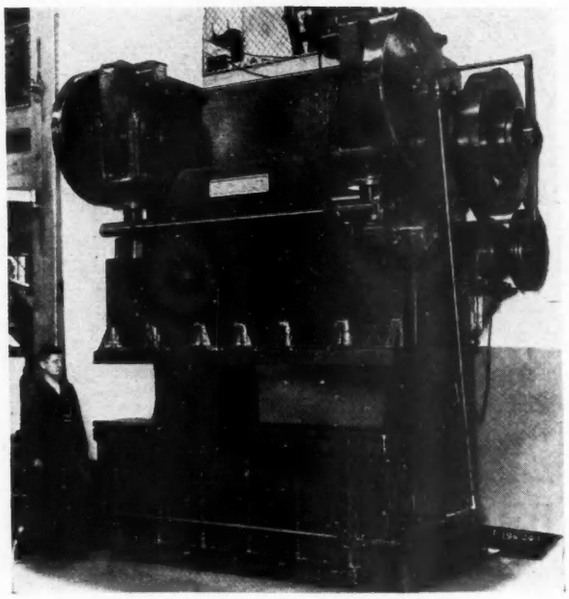
The Model MBH is available in two styles. The size 4 instrument with adjustments from 9/16 to 4 in. diameter of work, and the size 2, illustrated here, with an adjustment from zero to 2 in. diameter of work.

## Cincinnati Shaker 300-Ton All-Steel Press

ILLUSTRATED is a 300-ton, single-acting, double-crank press which will be used for multiple punching and riveting, recently shipped by the Cincinnati Shaper Co., Cincinnati, Ohio.

All main members are of rolled steel plate with welded joints throughout. Notice particularly the welding used in the bed and ram construction.

The stroke is 3 in.; motorized adjustment to the ram, 6 in.; die area of ram 16½ in. x 8 ft.;



die area of bed 17½ in. x 8 ft.; shut height is 20 in.; depth of throat, 10 in.

The main features other than the all-steel construction are automatic oiling, vee belt drive to flywheel, bronze bushed eccentric bearings, flywheel and ram adjustment mounted on anti-friction bearings.

## Federal Adds Seam Welders

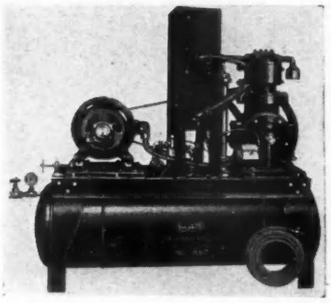
THE Federal Machine & Welder Co., Warren, Ohio, announces the addition of a standard line of Federal Seam Welders, built in transformer capacities from 50 to 150 kw. and with 16-point regulation through a separate regulating

coil. Speed of operation from 10 to 30 ft. per min. on 16 to 24 gage metal. Throat depths, 24 to 48 in. In this welder there are many unique features, such as pressure supplied by air through a toggle device, with easily accessible and readily adjustable spring control. All current-carrying parts water-cooled. No magnetic material used in or near welding rolls. Either or both rolls can be driven according to the requirements of the work. Equipment may be operated either on straight through or end seaming.

Announcement is also made of a line of light-duty welders made in throat depths from 6 to 12 in., with capacities of 5 to 7½ kw. These welders have a capacity from light material to two pieces 1/16 in. thick. The equipment is provided with a 6-point heat regulator.

## Brunner Heavy-Duty Water-Cooled Compressor

SPRAY painting, tire inflation, operating pneumatic lifts and hoists, pressure for the boosting delivery of liquids, tire inspection and many other applications of this nature are made available by the heavy-duty, water-cooled air compressors comprising the line of the Brunner Mfg. Co., Utica, N. Y. In construction these outfits have been designed with a low center of gravity for compactness. The tank is of seamless drawn steel suspended in the chassis so that vibration and operating noise are materially reduced.



The heavy duty line consists of Models 866, 867, 868 and 878. All are provided with 65-gal. tanks and will produce a maximum pressure of 150 lb. Motor size ranges from 3 to 7½ hp. Length and height are 67½ in. and 58 in. respectively while the widths which are the only variable dimensions vary from 25½ in. to 27¾ in.

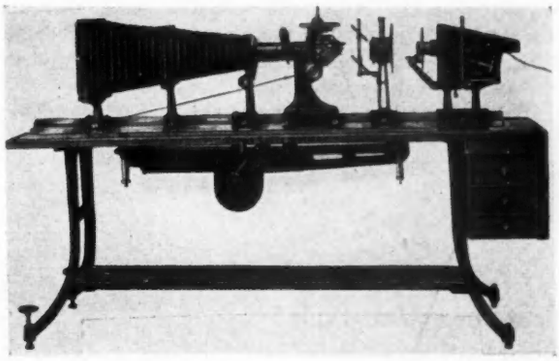
## Leitz Micro-Mettalograph

THE illustration shows the latest type Micro-Mettalograph, recently placed on the market by E. L. Leitz, Inc., New York City. Among the mechanical improvements in this instrument are the following: the microscope stand is heavier and more rigid. The object stage is now of circular design and greatly increased in dimensions. The fine adjustment is encased in a separate housing which provides an air space



protecting the micrometer screw against external thermal changes.

This instrument is also provided with a special

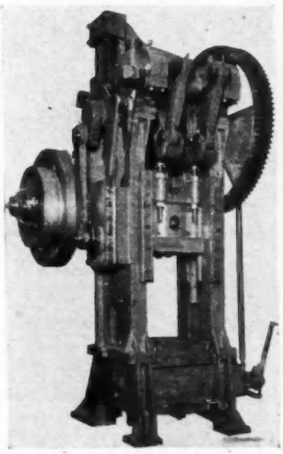


optical unit built in the vertical illuminator. This device is designed to materially increase flatness of the micro-image which is so desirable in photo-micrography.

A dark field illuminator with special objectives has been designed and will soon be available. The new machine has been so arranged that the dark field illuminating device can be added later.

## Improved Bliss Single Crank Toggle Presses

SINGLE crank toggle drawing presses Nos. 1½ to 3¾-B built by the E. W. Bliss Company, Brooklyn, N. Y., have been redesigned to include the following recent developments: The outboard bar guide for the cross-head has been discarded in favor of a gibbed guide. A further improvement is the substitution of a forked arrangement for the overhung pins of the short link to stiffen the blank-holder drive.



A full automatic friction clutch control is built into the right-hand leg of the machine. This device supplies either hand or foot control of the ma-

chine without the use of tools or any intermediate strips. When using foot control, the handle is stationary, but so arranged that it may be instantly used to stop the press on the way down.

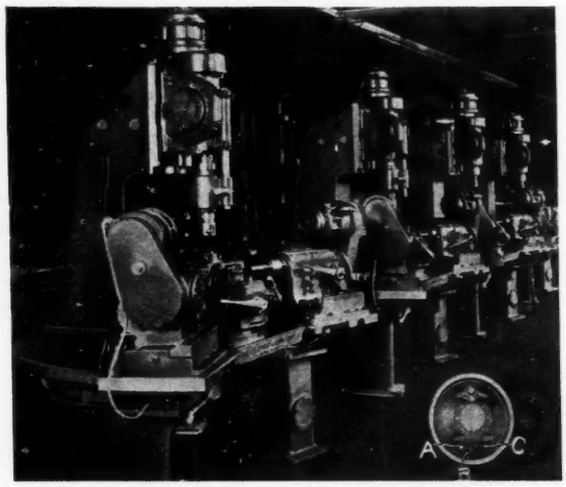
The flywheel, which runs freely on the shaft when the press is idle, is mounted on a pair of Timken bearings and provided with a new friction clutch having three steel driving disks with interwoven asbestos facing.

The saving in floor space right to left amounts to 22 in. for the No. 1½ and 31 in. for the No. 3¾-B.

## Bradford Unit-Built Special Installation

A BATTERY of machines has been developed by the Bradford Machine Tool Company, Cincinnati, Ohio, for performing two progressive operations on a front and rear brake housing hanger. These machines shown in photograph represent a typical adaptation of the unit-built type of special machine tools, as all machine elements such as tables, pedestals, columns and drilling or tapping units are standard units assembled to meet the requirements of this particular installation.

The first operation on the two parts consists of drilling two 15/32 in. holes 1⅛ in. deep at *A* and *C* with the horizontal units and counterboring the hole *B* with a combination tool 1.123 in. and .600 in. diameters. These tools are operating at a cutting speed of 118 ft. per min. on malleable iron and the floor to floor time is 35 sec.

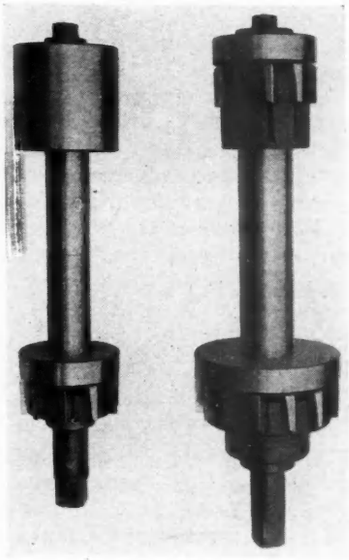



each. The second operation consists of reaming the holes *A* and *C* ½ in. diameter by 1⅛ in. deep and tapping the hole *B* ⅝ in. 11 thread. The reamers are operated at a cutting speed of 109 ft. per min. and the tapping speed at 45 ft. per min. The floor to floor time is 24 sec. This layout requires the cutting tools to overlap each other in the same hole and the cams controlling the feed of the individual units are arranged to give an interlocking action on the tools. Accordingly, a positive and accurate control of the feeding mechanism is provided by means of a hand valve located at the right front of the machine. This valve connects an air cylinder attached to the tripping levers of the individual heads, insuring instantaneous tripping control and the elimination of tool hazards.

Each unit is equipped with individual motors having individual overload and underload protection. A central control is also provided, enabling the entire machine to be started and stopped by means of a push button. A system for the distribution of cutting lubricants is also provided, operated by means of a commercial turbine pump, having an individual motor drive and controls. The pump is mounted at the back of the machine and does not appear on the photograph. One of the pedestals constitutes the tank for the storage of cutting lubricants.

## O.K. Hand Line Reaming Bar

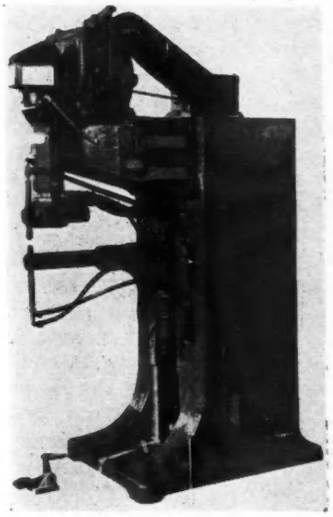
AMONG the many applications of O. K. Cutter Blades of interest to the automotive industry is the inserted blade hand line reaming bars manufactured by the O. K. Tool Co., Inc., Shelton, Conn. As shown, it consists of an arbor onto which are fitted piloting bushings followed by inserted blade sizing reamers. The reamers, incorporating the patented O. K. Taper Serrated Blade, may be resized, with a minimum of grinding. The cutter blade is of drop forged high speed steel, inserted into a forged and heat treated chrome nickel steel body. The O. K. Cutter Blade is a tapered wedge shape which fits a corresponding slot in the body. The 5 deg. taper



rigidly locks the blade in position. In addition, serrations are provided on the back of the blade which fit mating serrations in the body and the blade may be located and adjusted for wear.

## Thomson-Gibb No. 2 Automatic Press Welder

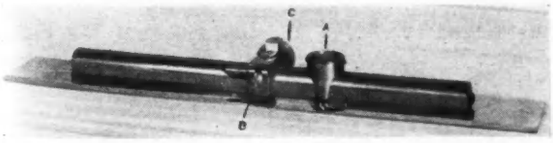
FIVE speed combinations and throat depths of 12, 18, 24, 30, 36 or 42 in. are available on the new automatic spot welder which was shown for the first time at the National Metal Exposition by the Thomson-Gibb Electric Welding Co., Bay City, Mich. This No. 2, or press welder, has a maximum welding capacity of two thicknesses of No. 10 gage metal. Moreover, the shorter stroke depth machines are efficient projector welders having a capacity of four projection welds at one stroke on 14-gage stock, the four projections being within a 4-in. radius.



A worm reduction unit is used on this machine to permit of moderately high speed until very close to the moving of the welding head, which, when set at the slowest speed, produces only 15 spots per minute. Accordingly, the worm shaft r.p.m. is always between 835 and 1760 irrespective of the spots per minute. Using heavy pressure springs this machine can produce pressures up to 2000 lb. An interesting feature is that all these machines are provided with an indicating pressure scale located in the welding head to facilitate the recording of desired pressure.

## Alpha Micrometer Rolling-Parallel Ruler

A MICROMETER controlled rolling, parallel ruler for the many purposes in the work of engineers and draftsmen where accuracy of spacing is required has been placed on the market by the Alpha Instrument Co., Washington, D. C.

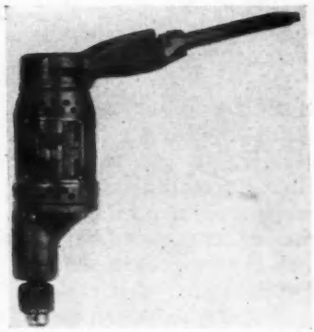




This ruler is especially recommended for section, lining, shading and logarithmic or trigonometric spacing. Referring to the illustration, A is the dial for reading wide spacings, BC is the worm gear with the dial at C for reading small or micrometer spacing. With ordinary care in operation an accuracy well within one-thousandth of an inch is claimed to be available. When in engagement, the worm acts as a brake and the ruler will not roll off a sloping or tilted drafting table.

## Thor High Frequency Electric Tools

SIX new tools, suitable for body trim, aircraft, and light metal work, have been added to the line of Thor High Frequency Electric Tools, manufactured by the Independent Pneumatic Tool Co., Chicago, Ill. These tools are of the midget type, and are made in two styles, Bonnet and Grip Switch. The Bonnet type style fits in the palm of the hand, and being light, is very easily handled. These small electric drills are especially designed for fast, accurate drilling.



The Bonnet type is made in three speeds as follows: AMC, 2300 r.p.m.; AMB, 2790 r.p.m., and AMA, 3700 r.p.m. The capacity is ¼ in.; weight 3 lb.; length overall 9½ in. The Grip Switch style is also made in three speeds as follows: AMC, 2300 r.p.m.; AMB, 2790 r.p.m., and AMA, 3700 r.p.m. The capacity is ¼ in.; weight, 4 lb.; length overall, 9½ in.

## Centrifix Straight-Thru Type Compressed Air Cleaner

WATER, oil, pipe scale, sediment and other impurities in compressed air, steam and vapor lines are said to be removed efficiently by the type RD compressed air cleaner recently placed on the market by the Centrifix Corp., Cleveland, Ohio. This unit employs centrifugal action to effect a positive separation of sus-

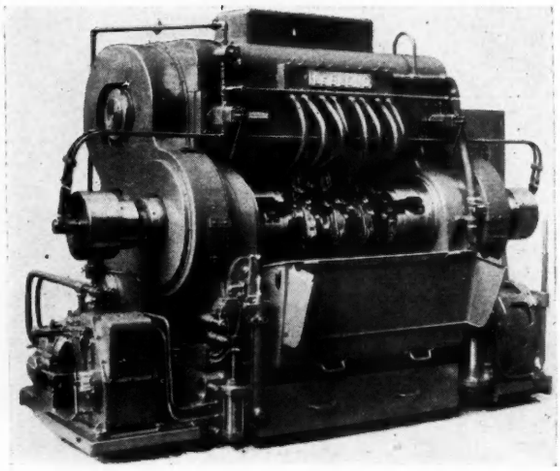
pended impurities. Air enters the cleaner body through a tuyere which directs it in a spiral, whirling motion. The heavier particles, such as water and other impurities, are thrown to the outer drain pockets while the clean air passes out through the central standpipe.

The type RD cleaner is recommended for compressed air, steam, vapor or gas lines not exceeding 125 lb. pressure and temperatures of 500 deg. Fahr. It is available in sizes from ¼ in. to 2½ in. nominal size of inlet.

## LeBlond No. 5 Automatic Pin Finish-Turning Lathe

TO eliminate the rough grinding operation on pin bearings of automobile crankshafts, a new machine has been developed by the R. K. LeBlond Machine Tool Co. of Cincinnati, Ohio, for simultaneously finish turning the diameter and facing the side walls. This machine, known as the 5ACP, resembles in general appearance the present 5AC machine but is designed to incorporate a different mechanical principle.

Due to the orbital motion required, two like master cranks are geared together with the spindle. These cranks are connected with a carrier, on the front face of which the tool block is mounted. The master shafts are so positioned in relation with the spindle that the cutting compound, chips and dirt cannot get into the various bearings. When the tools are withdrawn from the work, the cranks revolve so that the path of the tool is in the form of an ellipse. This is due to the driving gears on the top crank revolving around the intermediate gears as the cradle is moved back. This causes the two master cranks to get out of index in relation to each other. As the cradle advances the tools toward the work the elliptical path of the tools is gradually reduced. When the tools are finish cutting on the pins, the cradle has been moved up and held against the positive stops in the housings. The master cranks, at this location, have then moved into correct index with each other and the tools are moving in a true circular path. The cradle is actuated by a hydraulic cylinder through a rack, gear and toggle motion. The cylinder is located in a compartment in the center of the machine and is operated by an Oilgear pump driven by a 5 hp., 1200 r.p.m. motor. With this toggle arrangement of feed, the speed of the tools automatically decrease as they near the pins, giving a large displacement of oil in the cylinder and a very powerful feed.



The crank is held and driven at the flange and stub ends. To facilitate the rapid loading of the work the front part of each chuck is constructed so that the operator just places the crank in the guide opening and it slides into position. The crank is held in a half bush, in the main body of the chuck, by two jaws, each operated by a plunger. This plunger has a double taper on the front end which rapidly advances the jaw and then locks it in a clamping position on the work. An equalizing yoke connects the two plungers with the rod of the large air cylinder. To drive the crank, spots are milled on the webs adjacent to both the flange and stub end bearings. On the one side of the flange end chuck there is a positive gage block against which the crank is held. An adjustable stop is brought up to bear against the finished spot on the stub end to eliminate the possible springing of the crank due to the milled spots not being in line with each other. The crank is held against these stops by a small air cylinder which operates a swivel link through a locking plunger and lever. Automatic forced feed lubrication is supplied to all bearings. The oil supply is carried in the base of the machine and is pumped through a filter. A 25 hp. motor is used for driving the machine and the work spindles revolve at 30 r.p.m. On the walls of the pins 0.0035 in. is allowed on each side for grinding and 0.020 in. on the diameter. The slow speed at which the pins are machined produces a smooth finish with a production of 25 to 30 cranks per hour.

## Putnam Develops Plate and Sheet Slitter

A SLITTER designed to trim the sides or to slit into multiple strips mild steel plates or sheets up to and including 3/16 in. thick has been developed by the Putnam Machine Works, Division of Manning, Maxwell & Moore, Inc., Fitchburg, Mass.

Two housings carry a pair of arbors on which are mounted cutters that perform the slitting

work. Two sets of feed rolls keep the sheets and strips flat and straight while going through the cutters. Feed rolls and cutter arbors are geared together and driven through a reducing unit by a motor mounted at end of machine. Two operators are commonly required—one at the entering and one at the discharge end.

A new method is used to hold the cutters on the arbor. The cutters are the plain disk type without projections, which makes them strong and inexpensive. These cutters are mounted on hubs between shoulders. The hubs are then slid on the arbor from the end, the fit being very exact. A cam surface in the hubs binds on the top of the arbor key, and the cutter is held rigidly in place. This method allows the operator to make a quick and easy setup or change in width of cut.

Feed rolls are mounted parallel to and on both sides of the cutter arbors. They are arranged with vertical adjustment so they may be set open the desired width for various thicknesses of stock. This allows the sheet or plate being cut to enter between the feed rolls in the easiest manner. The rear feed rolls are on a swinging arm so they may swing out of the way when resetting cutters.

This machine is furnished in four sizes for handling sheets 24, 36, 48 and 60 in. wide and of various commercial lengths.

## Toledo Twin-Gear Straight-Column Press

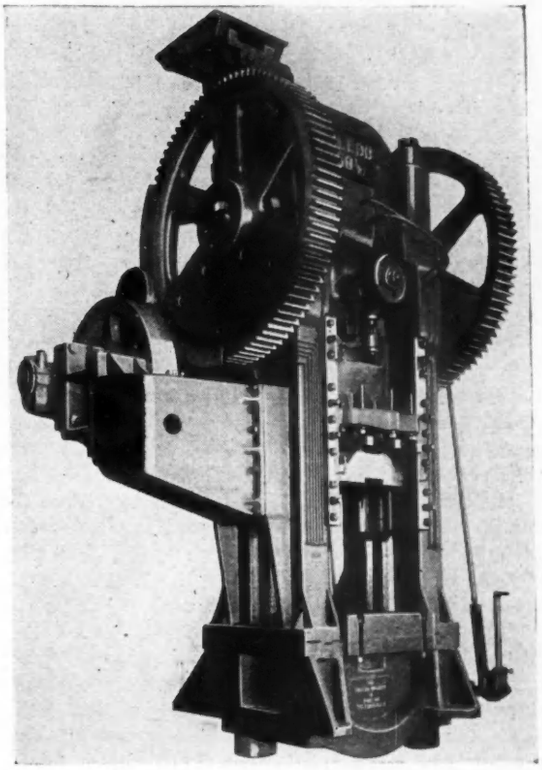
A LARGE straight-column press, primarily intended for heavy forming, flattening, and embossing operations, has recently been built by the Toledo Machine & Tool Co., Toledo, Ohio. With a view to obtaining maximum rigidity, the frame is made comparatively narrow, measuring only 43 in. between uprights. The crankshaft is of the "semi-eccentric" type. It is 13 in. in diameter at the frame bearings and 20 in. in diameter at the crankpin connection. The stroke is 16 in.

The slide measures 35 in. from right to left and 39 in. from front to back. It is equipped with a three-bar, direct-acting knock-out for removing the work from the punch. The slide adjustment of 6 in. is effected by means of a power elevator, which is mounted on the front of the slide, together with its motor.

Another feature of the machine is the compact arrangement of the gearing. The friction clutch is integral with the flywheel, and the latter is mounted on Timken tapered roller bearings, being the only moving part when the press is not in operation. The brake is of an improved clam shell type and is independent of the clutch, thus preventing the clutch from heating up.

The hand-lever for operating the clutch is fitted with a special attachment which permits of starting or stopping the press at will. By simply changing the position of a small stud at





the bottom of the hand-lever, the press is made to stop automatically at the top center.

Lubrication is furnished to all bearings through individual pipes, by means of a foot-operated grease gun. The press is operated by a 50 hp. motor which is mounted on top of the machine and is belted direct to the flywheel. The press weighs about 160,000 lb.

## Gleason Spur-Gear Testing Machine

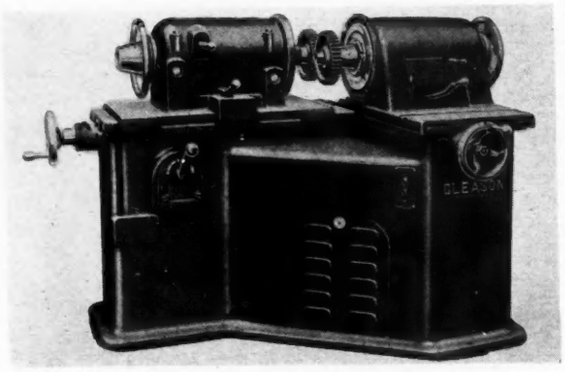
THE Gleason Spur-Gear Testing Machine just announced by the Gleason Works, Rochester, N. Y., was designed to test the running qualities of Spur Gears up to 14½ in. pitch diameter. It can be used for testing cluster gears as well as gears with an integral shank, also helicals, herringbones and internal spur gears. Gears are tested by running them together in pairs or by running several gears successively with a given test pinion. They can be tested with or without load as desired. The load is applied manually by a brake operating on the driven spindle.

Work heads are adjustable horizontally on

Automotive

# Machine Tool and Equipment

## 1931 Exhibition



the frame by means of a handwheel and lead screws graduated to show 0.001 in. They are mounted so the spindles are in exactly the same plane and parallel. Both heads are locked to the frame at front and rear by separate clamps which operate with equal tension from a single lever. The ways have rectangular gibs to take up wear and guards are provided to protect them from red lead and dust.

The spindles are mounted in the heads on matched ball bearings of an improved type with sufficient initial load to eliminate all evidence of radial or axial deflection under ordinary operating conditions. The noses of the spindles are heat treated and the taper bores are ground with the spindles in place on their own bearings, insuring concentricity between the spindle bearing and bore.

An outboard support for use with gears having a long integral shank is furnished with each machine. This support bolts directly to the frame as illustrated or an overarm type of support can be furnished if desired.

The spindles are driven by a 5 hp. motor mounted in the base of the machine. A variable speed (300 to 1200 r.p.m.) motor is recommended for the drive.

Floor space 61½ x 77 in. Net weight 4000 lb.

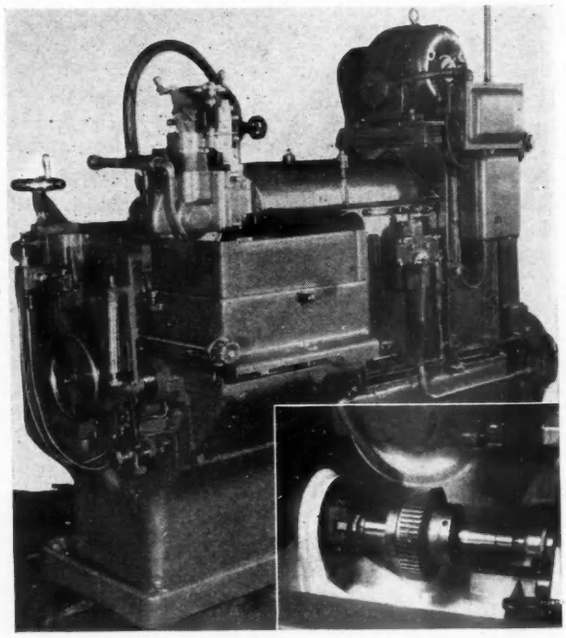
## Pratt & Whitney Hydraulic Gear Grinder

THE spur-gear, tooth-grinding machine recently acquired by the Pratt & Whitney Co., Hartford, Conn., is said to be the only machine of its type manufactured in this country using a single, double-cone shaped grinding wheel for grinding both sides of a gear tooth in one operation. In appearance this machine is similar to a horizontal shaper, as will be evident from the illustration. The capacity of this machine is 1 to 9 in. pitch diameter involute spur gears; 16 to 3 diametral pitch; and a range of pressure angles from 8 deg. to 25 deg.

The grinding wheel has a maximum diameter of 10 in. and can be used down to 6 in. diameter. Wheel thicknesses vary from ⅜ in. to ¾ in., depending upon the pitch of the gear being ground. The wheel is carried on the end of a short spindle 2 in. in diameter, which is carried by four ball bearings used in pairs, each pair being preloaded to 100 lb. Spindle speeds of 2250 and 2810 r.p.m. are provided which give surface speeds up to 7000 ft. per minute.

The wheel is dressed so that its periphery is, in shape and size, that of the straight-sided rack of the involute system. Dressing is done by a diamond in a sliding bar screw operated by hand, in the dresser head. The sliding bar can be adjusted to angles from 8 deg. to 25 deg., and the member holding the bar can be swiveled through 180 deg. so that both sides of the wheel can be dressed by the same diamond. A second diamond dresses the outside diameter of the wheel during the swiveling motion.

Master gears are mounted on the end of the work spindle. The master gear is a duplicate of the gear to be ground in number of teeth and diametral pitch and need not be a duplicate in



pressure angle. Master racks are of hardened and ground steel and one is required for each diametral pitch to be ground.

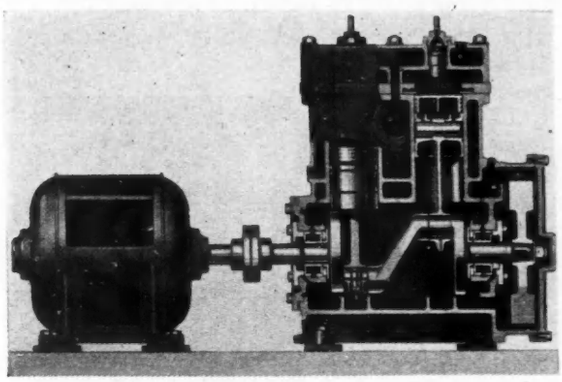
After each full revolution of the work, the hydraulic drive to all parts is automatically stopped by a mechanism which is operated from the motor through a link and a ratchet wheel which has the same number of teeth as the work. The wheel spindle and all pumps continue to run until the main electric motor is stopped by push button switch. The hydraulic system is started

by lever and can be stopped by this lever at any time.

Motor drive is 5 hp., 1200 r.p.m. Floor space required is 51 x 95 in. Net weight approximately 5000 lb.

## Bury Class 2V Motor-Driven Air Compressor

A LINE of motor-driven, twin-cylinder, single-acting, water-cooled compressors, with capacity up to 100 lb. air pressure, was recently



placed on the market by the Bury Compressor Co., Erie, Pa. These units are compact, so as to economize floor space, and are fully automatic in operation.

The Class 2V units are built in 8 sizes from 30 to 425 cu. ft. per min. displacement.

## Kurth & Knapp Hot Air Draw and Tempering Furnace

DRAWING and tempering of a variety of automotive parts such as ring gears, pinions, shackle bolts, piston pins and washers, are said to be facilitated by the new hot air furnace recently introduced by the Kurth & Knapp Mfg. Co., Detroit, Mich. The capacity of the furnace of course depends upon the time required for the stock to come up to temperature and the length of time to be held at the drawing temperative. The following figures will be indicative of these capacities: 2070 lb. net and gross per hour, when held 1 hr. at 350 deg. Fahr., and 1670 lb. per hr. when held 1 hr. at 450 deg. Fahr.

The furnace consists of a steel shell lined with suitable insulation and fire brick on the two sides and bottom. Sheet metal expansion joints are placed between the fire tile to allow for expansion and at the same time give sufficient support in case the tile should crack in the center.

The basket type furnace is provided with two lines of gravity roller conveyor made up for this particular application with provision for expansion. The tray type furnace, used to draw gears, is provided with steel strips for the trays to ride on, the trays being designed with spindles to hold the gears and are provided with



rollers for conveying through the furnace.

Baskets or trays of stock leave the furnace by means of a transfer chamber, on account of the hot air entering the furnace at this point under static pressure. To remove a basket from the furnace, the inside door is opened, thus allowing the operator to move the handle of the escapement mechanism which allows one basket or tray to enter the transfer chamber.

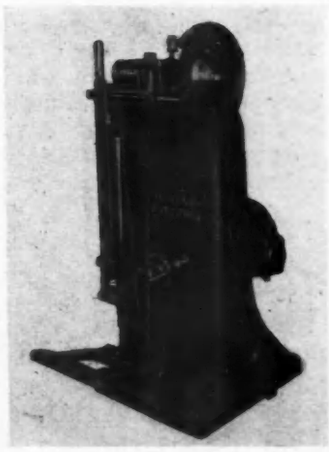
The air heater is a specially constructed direct fired induced draft type, consisting of a steel housing, lined with insulation, fire brick and fire tile. It is designed for oil or gas firing and it is possible to use a combination gas or oil burner at very little additional expense.

Hot air is introduced into the furnace at the leaving end and is counterflow to the work. The control instrument thermo-couple is placed in the air supply duct at the point where the air enters the furnace. The temperature at this point holds within the limits of plus or minus 3 deg. Fahr. The air is then forced through the baskets of stock and is returned to the heater and used over again.

Approximate floor space required, 200 sq. ft. Approximate weight per sq. ft. floor load, empty, 150 lb.; loaded, 170 lb.

## Type D Radiac Cutoff Machine

THE Type D Radiac Cutoff Machine has been added by A. P. de Sanno & Son, Philadelphia, Pa., to supplement the larger Type C machine. It is designed for use where light materials, one inch in diameter and under are to be cut. This machine has many of the mechanical features incorporated in the Type C, among which are the Radiac Cutoff Wheel; V-belt drive; a complete lubricating system, and heavy rigid mechanical construction. Being a simplified model, the type D machine is limited to straight cuts. The material to be cut is firmly held in a clamp oper-



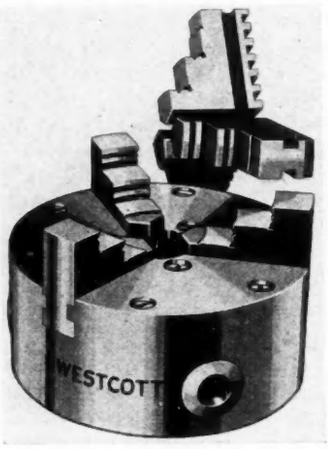
ated by the foot treadle. This permits rapid clamping and quick release where high production is required.

Motor drive is 3 hp. at 3600 r.p.m. Spindle speed is 5200 r.p.m. transmitted by V-belt from the motor drive. Floor space is 30 x 25 x 44 in., and the net weight approximately 750 lb.

## Westcott Bevel-Geared Universal Lathe Chucks

THE Westcott Chuck Co., Oneida, N. Y., announces that they have perfected a new line of bevel-geared scroll universal lathe chucks.

These chucks will be made in the following sizes: 3 in., 4 in., 5 in., 6 in., 7½ in., 9 in., 10½ in., 12 in., 15 in., 18 in., 21 in., 24 in. The last three sizes mentioned will be extra heavy. Sizes about 24 in. will be made to order. At the present time only the 4 in. size is ready for delivery, but the other sizes will soon be available. These chucks will be furnished with two sets of jaws; with one set for either outside or inside chucking at the customer's option or with two-piece reversible jaws.




This line has been designed to provide accuracy and at the same time possessing the strength to meet the requirements of modern production methods and the use of tungsten-carbide-cutting tools.

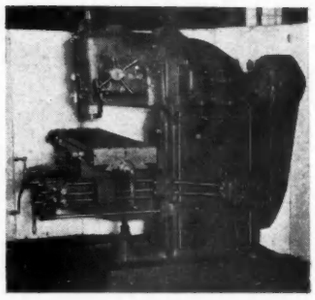
## Torchweld Gasoline Torch Cutting

AN all-purpose, gasoline cutting torch which will find a wide field of uses in reclaiming scrap and rapid cutting of bar stock and structural sections, has been placed on the market by the Torchweld Equipment Co., Chicago, Ill.

Among the advantages claimed for this gasoline torch are lower fuel gas cost; greater speed, and greater flexibility in handling. This torch is supplied complete with four gasoline cutting tips, 25 ft. of high pressure oxygen hose, 25 ft. of flexible metallic gasoline hose, and other essential accessories.

## Kempsmith Improves Vertical Maximiller Milling Machines

IMPORTANT improvements in the Maximiller line of vertically-adjustable spindle milling machines are made public by the Kempsmith Manufacturing Co., Milwaukee, Wis. Chief of these are given below:



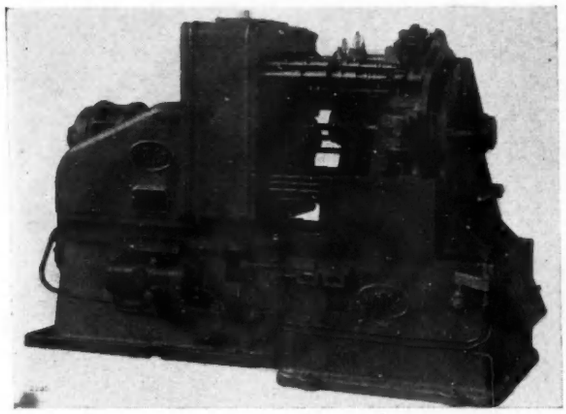
The starting lever has been carried to the front of the knee, providing a more convenient means of control of the spindle. The customer has option of either a high or low range of spindle speeds. Vertical feeds to the spindle in either direction are available, six in number, ranging from 0.002 to 0.035 in. Two rates of hand movement to the spindle feed are available, one by the smaller hand wheel moving the spindle 0.040 in. per revolution, the other through the star wheel, giving a movement of 2 in. per revolution for quick setting of the spindle. An accurate means of gaging the depth of recesses, etc., is provided by means of an indicator graduated to 0.0001 in., mounted on the quill on the front of the column. Provision is made for using Johansson blocks or any convenient type of fixed length gages when making settings for depth.

Model designation remains as before, namely, No. 2, No. 3 Special, and No. 4.

## Natco Horizontal Hydraulic Machine

ILLUSTRATED here is a one-way horizontal hydraulic machine arranged for drilling, reaming, boring, facing, rough and finish counterboring and tapping cast iron shock absorber bodies recently built by The National Automatic Tool Co., Richmond, Ind. It is composed of one standard Natco hydraulic unit; a six position trunnion-type fixture arranged for holding two pieces in each position; and a pedestal for mounting the fixture. The Natco Hydro Unipower system of hydraulic feed is used. It is semi-automatic in operation, the operator controlling the machine by use of one air valve.

The head of machine is equipped with a fixed center gear driven cluster box containing

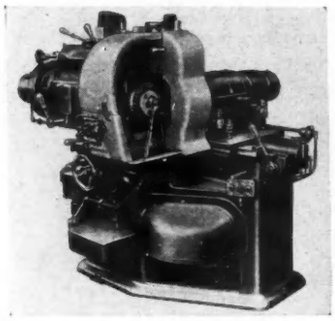


18 nose adjusting spindles, which are mounted on roller bearings where the spindle center distances will permit.

Production 145 pieces per hour.

## Gleason Testing and Lapping Machine

THIS new Lapping Machine for the quantity production of both spiral bevel and hypoid gears has been placed on the market by the Gleason Works, Rochester, N. Y. It can be arranged for any size gear commonly used for the final drive of automobiles, omnibuses, tractors and trucks.



In lapping, the gear and pinion are run together under load with a mixture of abrasive and oil. The pinion drives the gear and as the two rotate, the position of the gear is changed continuously and automatically to effect a combined horizontal and vertical movement of the gear relative to the pinion which results in lapping the entire surface of the teeth. To accomplish this, the gear spindle is journaled in an eccentric sleeve which is oscillated by a cam driven from a separate motor. After the gears are placed on the spindles, the machine is entirely automatic. It is hydraulically operated and the automatic features and timing are electrically controlled.

A 5 hp. motor, 1500 or 1800 r.p.m., is used for the main drive and is set in the base of the machine. Two small motors, one for the oscillating motion and the other for the lapping compound pump are furnished as standard equipment.

The power for operating the hydraulic features is provided by a central hydraulic unit, having a capacity of 2½ gal. of oil per minute (per machine) with 150 lb. pressure per square inch. This units is not furnished with the machine.

## Schauer Ideal ¼-in. Standard Duty Drill

THE Schauer Machine Co., Cincinnati, Ohio, builders of "Ideal" Electric Tools, have announced the latest addition to their line, a ¼-in. type LO standard duty drill. This tool is compact, measuring only 10½ in. over all, and weighs only 5½ lb. It embodies a specially designed motor with armature shaft and chuck shaft mounted on two ball bearings. The unique method of mounting these bearings makes for a much shorter drill, which is a big advantage in close corner work.

A removable plate on the housing permits ready inspection and adjustment of commutator and brushes, while a removable plate on the handle permits inspection of the switch connections. Trigger switch for convenient operation is mounted in a natural, comfortable, grip type handle. The cable is protected by a special clamp and spring, which eliminates any strain on the terminals.

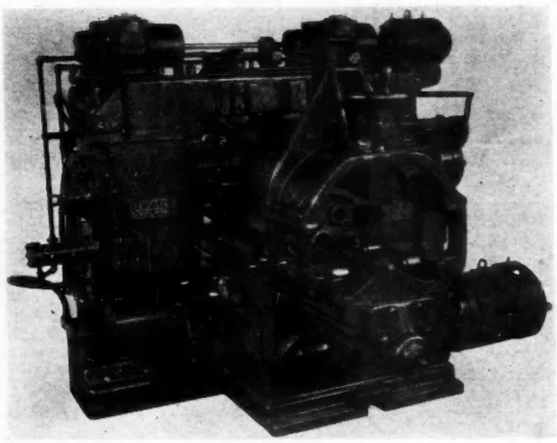
## Recent Installation of DeVlieg Supermil

AN eight-cylinder block installation of the DeVlieg duplex Supermil, recently made by the DeVlieg Machine Tool Co., Jackson, Mich.

The fixed spindles are of the usual quill mounting with ample adjustment for cutter wear. The disappearing spindles are of a boring bar type and the movement controlled by hydraulic cylinders, actuated by No. 1 Brown & Sharpe gear pumps, providing a pressure of 100 lb.

The structure is of the standard DeVlieg Supermil design, with duplex columns, hardened and ground, steel table ways of vee and flat construction, with a standard feed mechanism, using the regular hardened and ground feed screw for the longitudinal movement of table.

For the vertical movement, there is provided an individual, motor-driven pair of feed units, each using a standard, hardened and ground screw, the same as used in the main table feed. The vertical feed motor is directly connected to these units and the raising and lowering actuated by electrical controls through a reversing switch.



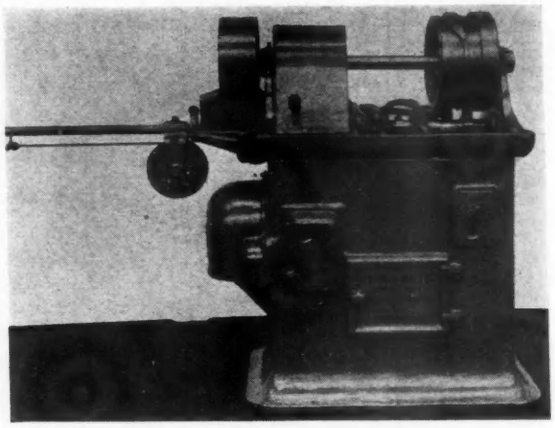
The disappearing spindles are actuated with hydraulic cylinders. The controls are operated by cams mounted on the top rail of the fixture, which, in turn, operate push rods controlling the forward and reverse positions of the oil valves. A separate push rod and control is required for each disappearing spindle.

The entire machine is automatically lubricated. The production is 25 finished pieces per hour. Carboloy cutters are used, running at a rate of 300 ft. per min. and the feed is at the rate of 25 in. per min.

## P. & J. Ekonomatic Nut Machine

A DECIDEDLY new product of the Potter & Johnston Machine Co., Pawtucket, R. I., is their Model No. 1 Ekonomatic nut machine with a capacity range from ¼ in. to ½ in. bolt size, either plain or castellated.

By using a cut-off tool of only 1/16 in. in width and a stock feeding mechanism which



carries the bar completely through the spindle to the gripping surface of the collet there is an absolute minimum of waste. Since this machine is of the single spindle type without an indexing mechanism, it has been found possible to use soluble oil coolants successfully.

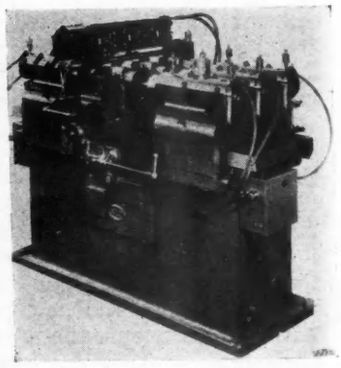
Only three cams are required for the operation of this machine. The collet operating mechanism is mounted on the camshaft directly over the spindle and consists of a swinging arm with cams for engaging and disengaging the collet at the proper point in the cycle. The collet is of the drawback type connected to the rear of the spindle. The pull back of the collet is accomplished by means of fingers which are compressed by an external wedge collar.

The bar is fed to the working position by means of a special mechanism employing a long, heavy coil spring within the feeding cable pulley.

The No. 1 machine requires the floor space of approximately 24 x 42 in. and is driven by a 2 hp. electric motor mounted in the base.

## Ex-Cell-O Precision Diamond Boring Machine

CONSIDERABLE time and money has been spent by the Ex-Cell-O Aircraft & Tool Co. in developing a diamond boring machine which can be used for more than the finish boring of holes with diamond or tungsten carbide tools, its design being such that on the same machine with a single loading and a single fixture, rough boring and finish boring may be accomplished. This in turn results in a real saving, inasmuch as it eliminates a rough boring machine, one handling and an operator. In addition to this saving it also assures that a minimum amount of stock is left for the removal by the boring tool on the



finishing operation and that this stock is concentrically distributed.

The boring tool is held rigidly in alignment thereby insuring the boring of straight holes. The moving table is of the Vand flat way type and carries the fixture and work while the boring head, rotating at a high speed, is mounted on an independent bridge. The weight of the complete machine is about 6600 lb., covering approximately 14 sq ft. of floor space, and the base is of the three-point support type. By this method of construction the possibility of pendulum effect, due to small supported areas and vertical rotating masses at considerable distance from the point of ultimate support, is eliminated.

The table on which the work is mounted weighs approximately 900 lb., while the slides on which the accuracy of the work depends are of ample area and the possibilities of vibration are reduced to a minimum. There are no belts, chains, or gears in the entire machine other than the oil pump and coolant pump which are gear pumps direct motor driven by a 2 hp., 900 r.p.m. motor. Each boring spindle has its individual built-in motor rated at ¾ hp., 3600 r.p.m. By this method spare spindles with their boring tools set to size, may be interchanged with a minimum amount of shut-down time for the machine.

## South Bend Tool Room Precision Lathe

A NEW Model Tool Room Precision Lathe has recently been introduced by the South Bend Lathe Works, South Bend, Ind. This model is built in 11-in. to 18-in. sizes inclusive, and may be secured in several different designs, including the countershaft drive or motor drive types, and with either straight or gap beds.

An automatic safety interlock is one of the features of this lathe. This safety lock prevents the automatic feeds from being used while the apron half-nuts are clamped on the lead screw for cutting screw threads, and it likewise prevents the half-nuts from being clamped on the lead screw while either of the automatic feeds is in action. When one device is in operation, the other cannot be used.

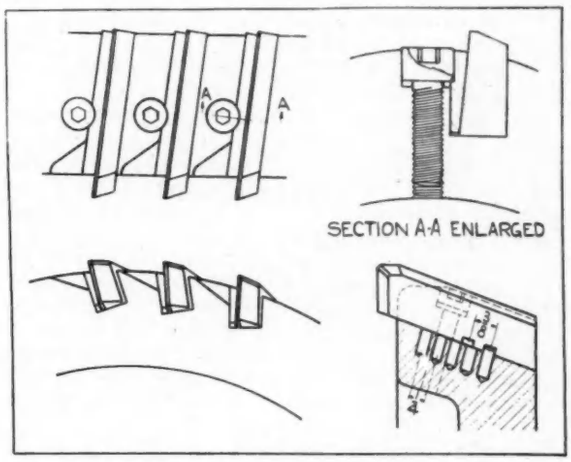
## Kearney & Trecker Face-Milling Cutters

A LINE of Positive-Lock face milling cutters of the inserted-blade type has been developed by the Kearney & Trecker Corp., Milwaukee, Wis. The cutters embody several features making them particularly adapted to accurate milling operations. The cutters are not intended for heavy hogging purposes, but primarily for medium roughing cuts, as well as for finishing operations. The blades are so spaced that the cutters are also suited for the milling of surfaces made up of thin, narrow sections.

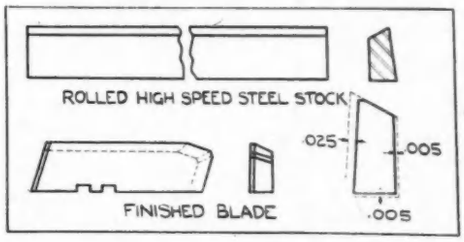
Two distinct styles are offered, one of which is equipped with high-speed steel blades, and



the other with Stellite. The only difference in the two styles is the angular mountings of the blades, these angles having been carefully developed to suit each of the cutting materials. The spacing of the blades for both styles is such that ample chip clearance is provided. The cutters can also be equipped with blades tipped with cemented-tungsten carbide, since their design embodies the efficient cutting characteristics so necessary in a milling cutter using this newer cutting metal.




METHOD OF HOLDING BLADES




DETAIL OF BLADE CONSTRUCTION

The illustration shows the shape of the hot-rolled high-speed steel bars before they are made into blades. After being cut to length and hardened, the blades are finish-ground to the form shown at the lower right, having 0.005 in. removed from the back face, and the inside and outside edges, and 0.025 in. from the cutting or front face. A finished blade is shown at the lower left.

Kearney & Trecker Positive-Lock inserted-blade cutters are made in fourteen sizes, ranging from 5 to 24 in. in diameter. The 5, 6 and 7-in. cutters are for use with style C, shell end mill arbors; the 8-in. cutter is arranged to bolt on the spindle and centered by a centering plug.

# What Has Gone Before—

## Machine Tools and Grinders

### Niagara Slip Roll for Forming Sheet Metal

A four-in. diameter roll for forming sheet metal cylinders has been added by The Niagara Machine & Tool Works, Buffalo, N. Y. Adjustment of the lower front and real rolls is accomplished through vise handled screws without use of wrenches. A compact unit, self-contained and entirely inclosed, can be readily applied to the Nos. 349, 351 and 353 hand operated forming rolls to operate them by power. A 2 hp., 1500-1800 r.p.m. motor is required. (July 26, page 135.)

### Straight-side Power Press

Up to thirty strokes per minute with a capacity of 250 tons are provided by the No. 6-19 straight-side power presses of built-up tie rod construction recently added by the Zeh & Habermann Co., Newark, N. J. Among the features of this press are: central lubrication; brake adjustment from the operator's station, and free access to the jaw clutch. The large driving gear is located close to the frame, thus eliminating the outboard bearing. (July 26, page 135.)

### Brake Drum Turning Lathe

The largest dual truck wheels may be swung without removing the tires, on the new Brake Drum Flywheel turning lathe developed by The Greaves Machine Tool Co., Cincinnati, Ohio. It is equipped with a Universal chuck with capacity for the full range of flywheels and is also adaptable for truing differential housings. (Aug. 2, page 170.)

### Moline No. 11 Hydraulic Machine

The Moline Tool Co., Moline, Ill., has brought out a new lapping or honing machine, known as the No. 11 hydraulic lapper with electric braking motor. One of the features of this machine is in the drive to the spindles. After the reciprocating rail has completed a predetermined number of strokes, and at the instant it reaches the end of the withdrawal stroke, a switch is automatically tripped, which reverses the main driving motor, causing it to act as a brake and to bring the spindles to a quick stop. The instant the motor stops, a stopping switch at the end of the armature shaft automatically shuts off the current, thus preventing the motor from running in the reverse direction. The hones can then be adjusted for stone wear, unless they are of the type which can be adjusted while the spindles are rotating. (Aug. 2, page 170.)

### Tool Revolving Automatic Chucking Machine

An intermediate sized unit, 8½ x 8, has been added to their line of tool revolving automatic chucking machines by The Goss & DeLeeuw Machine Co., New Britain, Conn.

It is identical in design to the other two sizes previously described, namely, 6 x 6¾ and 11 x 10, but is made midway in size and capacity. Goss & DeLeeuw patented 12 in. 2-Jaw Chucks are standard equipment. As on the other two machines, the threading spindle is controlled by a lead screw in constant engagement. (Aug. 2, page 171.)

### Fellows 6A-Type Gear Shaper Has 3-Inch Stroke

Limiting the cutting stroke on the 6A-type Gear Shaper to 3 in. instead of 5 in. has made it possible to eliminate the customary cutter-slice so as to use a one-piece cutter-spindle similar in design to that on the high speed gear shaper made by The Fellows Gear Shaper Co., Springfield, Vt. This change in design has increased the productive capacity of this machine, making possible the use of coarser feeds and somewhat higher reciprocating speeds. (Aug. 2, page 171.)

### Brown & Sharpe No. 00G Screw Machine

Thirty spindle speed changes ranging from 243 to 5000 r.p.m. are now available on their No. 00G Automatic Screw Machine (high speed) (for motor drive only) according to a recent announcement by the Brown & Sharpe Mfg. Co., Providence, R. I. No constructional features other than those required to include this change have been made and the methods of operation are the same as before. (Aug. 2, page 171.)

### Gallmeyer & Livingston Hydraulic Feed Grinder

Gallmeyer & Livingston Co., Grand Rapids, Mich., has added a new size of surface grinder with hydraulic feed, known as the No. 2. It has a table working surface of 6 in. by 18 in.

By means of a control lever at the front of the base the table feed can be varied from nothing to 60 ft. p. m. or more. Cross feed can be varied from 0.01 to 0.125, and can be made to operate at either end or at both ends of the stroke, as desired. It is also operated hydraulically. (Aug. 9, page 203.)

### Heavy Pillar Type Percussion Press

One hundred tons capacity with 25 strokes per minute is provided by the No. 14-10B patented pillar type percussion press added by the Zeh & Hahnemann Co., Newark, N. J., to supplement their 50 and 75 ton models. It is adaptable for light metal work of large area, for grinding wheels, and prepressing Bakelite and other molded materials. (Aug. 9, page 204.)

### Landis Bolt Factory Threader Improved

The addition of a constant speed motor drive and a pick-off gear box are among the important improvements in the newly redesigned bolt factory threader built by the Landis Machine Company, Waynesboro, Pa. It is a triple spindle, high production bolt threading machine available in 1 in. and 1½ in. sizes. With the new gear box it is possible to obtain the most efficient threading speed for any particular job, fifteen threading speeds ranging from 38 to 271 r.p.m. being available with eight sets of interchangeable gears. Other speeds can be obtained by the substitution of different gears. (Aug. 9, page 204.)

### "Modern" Diamond Lapping Machine

A diamond lapping process for finishing cemented tungsten-carbide tools is offered in the vertical and horizontal type lapping machines, type V-1 and H-2 respectively, which have been placed on the market by The Modern

**Being a detailed review of machine tools, small production items and shop equipment announced just prior to the Production Issue of Automotive Industries + + + + + + +**

Diamond Tool Co., Detroit, Mich. The chief feature of these machines is the diamond lapping tool, available in any desired form, made by a patented method of impregnating the surface structure of the tool with diamond powder. (Aug. 9, page 204.)

## Variable Speed on Kent-Owens Miller

Possessing essentially the same features as the No. 1 miller described in the issue of June 21, 1930, the No. 2 miller recently announced by the Kent-Owens Machine Co., Toledo, Ohio, is designed for heavy duty production and jobbing work. The variable speed drive is exactly the same except that an idler pulley has been added. (Aug. 30, page 312.)

## Blount Grinder for Tungsten-Carbide

Flexible free-hand grinding of cemented-tungsten-carbide tools is afforded by the Blount 14 in. wet cup wheel grinder recently placed on the market by the J. G. Blount Co., Everett, Mass. To facilitate rapid grinding with correct angles on rakes and clearances of tools, an easily adjustable table is provided. It is arranged to give angles in two different planes with respect to the wheel, while the third angle is obtained by a sliding protractor guide against which the tool is held in the process of grinding. The table as a whole has a vertical adjustment to permit grinding various sizes of tools and a horizontal adjustment to accommodate wear of the wheel. (Aug. 30, page 312.)

## Grob Continuous Filing Machine

Three speeds, 170, 195 and 220 ft. per min. respectively and a Tex-rope reduction drive feature the model No. 1 continuous type filing machine recently placed on the market by Grob Bros., West Allis, Wis. Among other useful applications, it is well adapted for the manufacture of special tools, dies and the filing of internal holes.

The continuous file chain is made up of a series of links which operate on two sheaves, one located in the base of the machine, which is the driver, the other located in the head, which is the idler. Adjustment to compensate for correct filing tension is obtained by a hand wheel located on the top of the head. A heavy helical spring is used to maintain the proper tension and to act as a cushion for maintaining a uniform drive. (Sept. 6, page 348.)

## Tabor Draw Molding Machine

A newly designed plain-jarring, rollover, pattern draw molding machine is announced by The Tabor Mfg. Co., Philadelphia, Pa. This machine has a rollover plate 18 in. x 28 in.—8 in. pattern draw and is equipped with quick-acting air clamps and cradle elevator. The operation of rolling the mold over is controlled by air on oil. This permits maximum speed with absolute safety. (Sept. 6, page 348.)

## Wells Thread Grinder For Taps and Gages

The "Wells" Thread Grinder, designed for grinding taps, thread gages and other screw threads to close limits up to 2½ in. diameter and with a threaded portion 3½ in. long, is offered by the Wells Manufacturing Company, Greenfield, Mass. Straight or tapered work may be ground with either right-hand or left-hand threads.

Two individual motors are used, one for the work drive and the other for the grinding wheel. These may be of any standard voltage. Floor space required is 26 x 65 in. Net weight is 1400 lb. (Sept. 6, page 349.)

## Gleason Works Bevel Gear Testing Machine

This machine, designed to test the running qualities of straight and spiral bevel gears of the smaller sizes whose shafts intersect at 90 deg., is announced by the Gleason Works, Rochester, N. Y. Bevel gears are tested by running them together in pairs or with a reference gear and with or without load as desired. The load can be applied manually by a brake operating on the driven spindle or can be set for a fixed amount. (Sept. 6, page 349.)

## Automatic Screw Chasing Attachment

The Model B Hartness Automatic Screw Chasing Tool is a redesign of the regular tool, according to a recent announcement by the Jones & Lamson Machine Co., Springfield, Vt., using a hardened and ground cutter bar with a bushing in the main casting at the front, while a yoke has been added at the back end of the cutter bar to support the lead screw. This attachment uses a new type of circular cutter held to the cutter bar with a tapered bushing. This type of cutter is said to have a longer life, and one cutter will cut either right or left-hand threads, internal or external, of the same pitch; also a shear pin has been added to the driving rod to protect the mechanism should anything bind. (Sept. 13, page 382.)

## Hanna Differential Case Riveters

Riveters designed especially to meet the requirements of manufacturers of differential case and crown gear assemblies have recently been added to the line of production equipment manufactured by the Hanna Engineering Works, Chicago, Ill. Because of the heavy pressure applied to form rivet heads, the machines are arranged to drive two diametrically opposite rivets at the same time, to insure symmetrical clamping of the parts. (Sept. 13, page 383.)

## Bradford Develops 3-Head Drill Press

A three-head machine has been developed by the Bradford Machine Tool Co., Cincinnati, Ohio, with special tooling equipment for producing a pump body. The tooling equipment consists of four work-holding fixtures mounted on a hand-operated turret. One station is used for loading and unloading the fixture, while a series of drilling and reaming operations take place at the other three stations. The horizontal units drill single holes, while the cluster box, mounted on the vertical head, carries the tools in three groups, in order that this unit may perform operations in each of the three working stations.

This machine is readily adaptable for general production work by changing the tooling equipment. Multiple-spindle cluster boxes may be mounted on the horizontal units, and the turret may be arranged for automatic indexing if necessary. (Sept. 20, page 420.)

## Zeh & Hanemann Double Crank Power Press

For blanking small parts, such as transformer laminations, in large quantities, the Zeh & Hanemann Co., Newark, N. J., have brought out a Double Crank Power Press with automatic roll feed, which permits cutting sheets without prior slitting. This press has a capacity of 50 tons and provides 50 strokes per min. Using

# Tools, Dies and Welding Equipment

five dies, an output of 250 blanks a minute may be obtained. (Sept. 20, page 421.)

## A. C. Campbell Nibbling Machine

A range of sheet thickness from ⅜ to ¾ in. and three selective strokes, 1 in., 13/16 in. and ½ in., are provided by the No. 3 Nibbling machine recently placed on the market by A. C. Campbell, Inc., Bridgeport, Conn. This machine cuts fast in any direction—approximately 20 linear inches per minute. Like the smaller nibbling machines, it works on the circular punch and die principle, with a pilot to prevent the work from slipping and the punch taking too large bites. The cutting is said to be clean without burr, and little finishing is necessary when an absolutely smooth edge is required. (Oct. 4, page 492.)

## Threadnut Automatic Nut Tapping Machine

Threadnut No. 1, a new double-spindle automatic nut tapping machine, with a range in sizes from ¼ in. to 7/16 in. U.S.S. or S.A.E. hex and square nuts, is announced by the Automatic Nut-Thread Corp., Philadelphia, Pa. The special feature of this machine is two tapping spindles fed by a single hopper of the rotary-disk type. Two centrifugal pumps are provided, one for each spindle, which force the coolant liquid through a flexible steel hose to the tapping spindle playing directly onto the tap. (Oct. 11, page 526.)

## Porter-Cable Offers Syracuse Belt Sander

Two operating speeds and a vacuum dust collecting attachment feature the type B-9 belt sander recently placed on the market by the Porter-Cable Machine Co., Syracuse, N. Y. Moreover, this is a double-purpose machine, being adaptable for both vertical and horizontal applications.

Among the many uses of this sander are the following: burring, polishing, cleaning up castings, sharpening tools, and many others. (Oct. 4, page 492.)

## Mummert-Dixon Spot-Facing Tool

Mummert-Dixon Co., Hanover, Pa., has placed on the market a compound spot-facing tool designed for the quick and accurate facing of small bosses. This tool has a set of roughing and a set of finishing cutters. The roughing cutters have saw-tooth cutting edges which are claimed to quickly break up the hard scale on cast iron or steel and to cut the bosses down to approximately the required size in short time. These roughing cutters are movably arranged in the head, so their cutting faces may be set ahead of the finishing cutters and do all the rough-cutting without the finish cutters touching the work. (Aug. 9, page 204.)

## Barber-Colman High-Production Hob

Barber-Colman Company, Rockford, Ill., has marketed a new hob which embodies two variations from conventional practice. An investigation showed that the tips of the teeth of the ordinary hob do by far the greatest amount of work in removing metal, and it was evident that if these tips could be widened they would be strengthened. This is accomplished in the new hob by assuming a pitch diameter for the gear to be cut smaller than the actual pitch diameter, and laying out the profile of the shop on the basis of this assumed larger pitch diameter. This makes the pressure angle of the hob smaller than that of the generated gear, gives wider tips on the hob teeth, and makes the hob teeth narrower at the base, without disturbing the outline of the generated gear teeth. (Aug. 9, page 204.)

## Spherical Work Ground by the Centerless Method

Accurate grinding of spherical work such as balls of hardened steel, cast iron, monel metal, glass, casein, hard rubber and bakelite is the latest development in centerless grinding, according to an announcement by the Cincinnati Grinders, Inc., Cincinnati, Ohio.

The fundamental principles involved in centerless grinding operations are employed except that the regulating or feed wheel is arranged somewhat differently. The grinding and regulating wheels are both trued radially for ball grinding. In order to generate a true sphere on each ball, the regulating wheel is mounted on a special collet at an angle of 12 deg. to the axis of the regulating wheel spindle. This produces a constantly varying inclination of the regulating wheel relative to the grinding wheel axis as the regulating wheel spindle revolves. (Aug. 9, page 204.)

## Diamond High-Speed Surface Grinder

Designed for finishing such work as dies, punches, spacers, flat and formed cutters, and similar pieces, the Type G, high-speed, hydraulically driven surface grinder is now offered by the Diamond Machine Co., Providence, R. I. It will grind work 7½ in. wide, 22 in. long and 9 in. high beneath a 10-in. wheel.

The drive, as well as the power cross-feed, is of the hydraulic cylinder and piston type, actuated by the pressure of oil pumped from the reservoir in the bottom of the bed. The cross-feed may be operated manually by turning a knob which disengages the power cross-feed. (Oct. 4, page 493.)

## "Hisey" Heavy Duty Portable Grinders

Hand grinders of 1 hp. and 2 hp. capacity, available for both D.C. and A.C. current, are being marketed by The Hisey-Wolf Machine Co., Cincinnati, Ohio. The single-phase A.C. machines which may be operated from a lamp socket are equipped with improved commutating-type repulsion induction motors, which have no dragging centrifugal switch. They will start and pick up speed instantly under any load within twice their rated capacity. Starting current under all conditions is said to be unusually low. (Sept. 6, page 348.)

## No. 44 Little Giant Pneumatic Drills

The Chicago Pneumatic Tool Co., New York, N. Y., announces the No. 44 line of Little Giant Pneumatic Drills to supersede their No. 2 line. The No. 44C in three capacities, 1¼, 2 and 2¼-in. diameter drills, is non-reversible, while the No. 44RCA in the same range of sizes is of the reversible type. (Oct. 11, page 526.)

## Hercules Major Drills for High Manganese Steel

Production drilling of high manganese steel is said to be facilitated by Hercules Major drills, according to the recent announcement by Whitman & Barnes, Inc., Detroit, Mich. This new drill is made of a special steel high in cobalt and tungsten. The web is heavier and the twist but two-thirds the length of regular taper shank drills, providing a rugged and heavy construction. The drill is

pointed with a 68-deg. angle, while the cutting lip has been blunted to strengthen the cutting edge. (Aug. 9, page 204.)

## Bolt-Die Heads Beaver Ratchet

Users of No. 3 Beaver Ratchet Die Stock (⅛ to 1 in.) will be glad to learn that bolt-die heads are now available for this tool for threading bolts, rods, etc., in all sizes from ⅛ to 1 in. inclusive.

Complete information regarding these new bolt-die heads for the No. 3 Beaver Jr. may be had by writing to the Borden Co., Warren, Ohio. (Sept. 13, page 382.)

## Style KL Geometric Self-Opening Die Heads

A new line of self-opening die heads, style KL, ranging from 9/16 to 5 in. size, has been added by The Geometric Tool Co., New Haven, Conn.

Equipped with a lever trip (sometimes known as an outside trip), it is particularly adapted to short threads or threads of fine pitch where the pull-off type of trip is not sensitive enough. All stress in tripping is removed from the chasers and from the threads being cut, thus preventing torn threads. The trip lever is so placed that it will contact with an adjustable stop, which may be easily rigged up for any machine. (Aug. 30, page 313.)

## Hercules Interchangeable Punches and Retainers

Hercules Interchangeable Punches and Retainers, recently introduced by Whitman & Barnes, Inc., Detroit, Mich., present an advance in metal punching practice, the principal advantage of which eliminates the necessity of removing the die from the press to change punches.

The Hercules Interchangeable Punch system consists of a removable punch held in a retainer by a detent (latch or pawl) acting in recess in the shank of the punch. The punch is instantly released when the detent is pushed upward out of the recess by an extractor pin working through the retainer block. (Sept. 20, page 421.)

## Jones & Lamson Tangent Type Die

A new tangent type die, their Model 21, has been marketed by the Jones & Lamson Machine Co., Springfield, Vt. In this die the chasers are held tangent to the work and possess the unique advantage that the dull and worn portion on the ends may be completely removed at a sacrifice of only a fraction of the length of the chasers. Furthermore, as the grinding is done on the ends of the chasers and not on the chamfer, machine adjustments for the length of thread do not have to be made when chasers are changed. (Sept. 20, page 420.)

# Grinders, Drills and Specialties

## G.E. Atomic Hydrogen Welding Machine

The General Electric Co., Schenectady, N. Y., announces an automatic welder for atomic hydrogen welding. This is the first application of automatic equipment to this welding process, and was exhibited for the first time at the National Exposition in Chicago, Sept. 22 to 26.

The new welder is designed for longitudinal seam welding of all kinds. It consists of a clamping mechanism for holding the work, an automatic travel carriage, a welding head and the usual control devices and accessories. In addition, there is an auxiliary feeding device for feeding filler rod into the arc, as the tungsten electrodes used to form the arc are consumed slowly and do not contribute metal to the weld. (Oct. 4, page 493.)

## Oxweld Aluminum Welding Rod

The Oxweld Acetylene Co., New York, has introduced a new welding rod, designated Oxweld No. 23 Aluminum Rod, which is recommended for welding either aluminum sheet or castings when the metal is tightly held in jigs, and is not free to move. (Sept. 20, page 421.)

## Oxweld Two-Stage Oxygen Regulator

The Oxweld Type R-43 Oxygen Welding Regulator, recently introduced by Oxweld Acetylene Co., New York, guarantees a freedom from fluctuation in line pressure by means of a system of two-stage pressure reduction. This is accomplished through two separate and independent sets of diaphragms, valves and springs (Sept. 20, page 420.)

## Wilson Red Processed Arc-Welding Wire

In addition to the complete line of Wilson "Colortipt" Arc-Welding Wire, the Wilson Welder & Metals Co., Inc., North Bergen, N. J., has placed on the market a low-priced, general-purpose rod, known as Wilson Red Processed Arc-Welding Wire.

This wire combines fast and smooth flowing qualities with good penetration. It is said to produce a weld of at least 50,000 lb. per sq. in. tensile strength, and is especially recommended for general welding operations where medium ductility is required. (Oct. 4, page 493.)

## Weldite Fillet Putty for Welded Parts

To cover weld beads and to provide a finished appearance for welded parts, jigs and fixtures. Weldite Fillet Putty has been developed by the Fusion Welding Corporation, Chicago, Ill. This putty is easily applied to weld beads in any type of joints or position. (Sept. 13, page 382.)

## Quigley "Q-Seal" Expansive Compound

The Quigley Co., Inc., New York City, manufacturers of Hytempite and Triple-A Protective Coatings, have placed on the market Q-Seal, a plastic, expansive compound for sealing joints. Q-Seal is easily applied with a brush. It seals joints leak-proof, prevents rust and corrosion. Joints fabricated with it may be broken with ease regardless of age or service conditions. (Oct. 11, page 527.)

## Crown Rubber Plating Racks

Solid, soft-rubber covered plating racks built up from standard rods ⅜ in. sq. with a carrying capacity of 100 amp. have been placed on the market by the Crown Rheostat & Supply Co., Chicago, Ill.

This is a solid, soft red rubber-covered rack, of one-piece construction for each straight spine. There are no seams, except at the joints—and these are tightly sealed, and no soldered joints. Another feature is the direct connection of the hooks with the spine—each hook being seated and sealed with a rubber washer, and made easily removable for replacement. (July 26, page 135.)

## Cutler-Hammer Develops Three-Position Pilot Switch

Motor-driven pumps, compressors and similar machines which are controlled by an automatic pilot device such as a float switch, pressure switch, time clock, etc., often require some means of starting and stopping the motor manually. For this purpose, Cutler-Hammer, Inc., Milwaukee, Wis., have developed a new three-position pilot switch. The operating lever can

# Shop and Laboratory Equipment

be placed in either the "automatic," "off" or "manual" position. Turning the lever to the "manual" position closes the control circuit direct and the motor will run continuously regardless of any other control devices. (Aug. 9, page 202.)

## Clark Power-Driven Tiering Twin Veyor

A new portable, flexible, power-driven elevating and tiering conveyor, known as the Clark Twin Veyor, has been placed on the market by the Clark Trucktractor Co., Battle Creek, Mich. Two tubes with external helices upon them are turned toward each other by a power head, and anything placed upon them travels forward rapidly. The manufacturers believe it has a field in automobile body plants in conveying, elevating and stacking baled hair and other upholstery materials.

A standard unit consists of six 8-ft. dual sections and a power head. Each additional section is joined to the assembly with an automatic lock. It is easily shifted about by one man, and the entire 50-ft. line can be assembled or disassembled in six minutes, it is claimed. (Aug. 9, page 202.)

## American Foundry Electric Heater

The American Foundry Equipment Company, Mishawaka, Ind., has recently placed on the market a new electric space heater for industrial and commercial uses. In the production of this device, alloy heating strips are cast integral with composite fins of aluminum alloy to form a single smooth casting that will allow a free flow of air through its channels. Castings of this type are assembled into a cabinet. Back of this cabinet there is an electric fan which forces a current of air through the heated fins and out into the space where the heat is desired. (Aug. 23, page 275.)

## G.E. Float Switch With Mercury Contacts

For use in atmospheres where the open-type mechanical contacts may be subject to corrosion or where exposed mechanical contacts are unsuitable for other reasons, the General Electric Co., Schenectady, N. Y., has developed a new float switch with mercury contacts. The mercury contacts, moreover, make the device suitable for heavy duty, and it can be used for connecting motors up to a variety of pacities. (Oct. 11, page 526.)

## Crescent Electric Power Lift Truck

An intermediate type of power lift truck for use with hand truck skids is announced by the Crescent Truck Co., Lebanon, Pa. This truck has a capacity of 3500 lb. and is designed to serve requirements between the heavy-duty power truck and the hand-lift type. Two speeds forward and two reverse are provided. (Oct. 4, page 493.)

## Barrett Multiple Lift-Truck

A new multiple lift-truck with a 200-deg. side lift and a range lift of from 2 to 8 strokes is a recent development of the Barrett-Cravens Co., Chicago, Ill. Among other features, this truck is provided with a spring handle holdup and an automatic releasing latch which prevents the handle from flying up. The trucks have 2½ to 3 in. lift and a capacity of 6000 lb. (Aug. 30, page 313.)

## Meriam Flow Meter for Radiator Testing

A simple device for testing radiators with regard to flow conditions has been placed on the market by The Meriam Company, Cleveland, Ohio. It consists of a 110-gal. tank, a Meriam floating flow-meter, and a very flexible 2-in. hose-pipe for connecting up to the radiator to be tested by means of a slip-on adapter. The valve for the control of the water flow is a simple and light aluminum screw clamp which collapses the hose against a rubber saddle vulcanized to the inside of the control point. (July 26, page 135.)

## B. & S. Fillet and Radius Gages

A series of fillet and radius gages recently announced by the Brown & Sharpe Mfg. Co., Providence, R. I., can be used for checking on one blade concave and convex radii of the same size. The blades are long and easily used in places formerly hard to reach. They are slotted and slide easily, making many blades available at one time. A large clamp nut locks the blades securely in any desired position. (Sept. 13, page 383.)

## The Burgess Electric Bearing Tester

To provide an improved and scientific method for the inspection of ball and roller bearings, the Burgess Bearing Tester has been placed on the market by the Burgess-Parr Co., Chicago, Ill. By means of this instrument, bearings are said to be sorted more definitely and accurately than by the old method of listening to them. (Oct. 4, page 492.)

## Uehling Self-Contact Potentiometer Pyrometer

A new instrument for measuring and recording high temperatures has been developed by the Uehling Instrument Company, Paterson, N. J. It was designed primarily for measuring the high temperatures that are being worked with in the iron, steel and ceramic industries, but it lends itself equally well to the measurement of temperatures in any other line of work. Either a thermocouple or an electric resistance bulb may be used for the temperature-sensitive element. (Sept. 13, page 382.)

## Baird Horizontal Six-Spindle Lathe

Here is the work end of this new product of the Baird Machine Co., Bridgeport, Conn. The rest of the machine is very similar to the Baird Horizontal Six Spindle Chucking Machine. It was designed to handle work best turned on centers and the center bar of the machine carries a turret containing the tail centers, this bar and turret indexing with the spindle turret. (Oct. 11, page 529.)

## Putnam Rod Boring and Drilling Machine

This multiple boring machine is one of the line of Putnam Vertical Cylinder Boring Machines offered by the Putnam Machine Works, Fitchburg, Mass., Division of Manning, Maxwell & Moore, Inc.

The head is of unit type with drive from motor to spindles through a minimum of short sturdy shafts. All bearings in the head are Timken Tapered Roller Bearings, mounted in heavy steel plates. (Oct. 11, page 530.)

## Feed-Matic Thru-Feed and In-Feed Hoppers

Improvements in Feed-Matic Thru-Feed and In-Feed Hoppers for automatically feeding work to Cincinnati Centerless Grinders have been announced by Cincinnati Grinders, Inc., Cincinnati, Ohio. By using these hoppers in conjunction with centerless grinders, manual feeding operations are eliminated. (Oct. 11, page 531.)

# NEWS OF THE INDUSTRY

## Chevrolet Purchases Martin-Parry Plant

### Jamieson Becomes Head Of Truck Body Unit; is Only Personnel Shift

DETROIT, Oct. 14—The Chevrolet Motor Co. has purchased the Indianapolis plant of the Martin-Parry Corp., which it will at once put into full-time operation for the production of certain types of commercial bodies, according to an announcement here today by W. S. Knudsen, president of Chevrolet.

Included in the purchase are 40 acres of land, 550,000 sq. ft. of factory floor space, an additional 150,000 sq. ft. of lumber storage space under roof, railway right-of-way, as well as 21 branches operated in various parts of the country.

J. A. Jamieson, comptroller of Chevrolet, will become general manager of the new development which will be known as the Chevrolet Commercial Division of the Chevrolet Motor Co. The rest of the personnel in the organization will be taken over intact. Employment at capacity will total 600 men.

## Ford's Percentage of Total Sales Dropping

PHILADELPHIA, Oct. 16—A further decline in Ford's percentage of total passenger car sales is indicated by September state registration totals so far available.

In the 11 states for which September figures have been released, Ford's percentage of total car business was 36, as compared with 38 per cent in August and with 41.26 per cent in the first eight months of this year.

For the industry as a whole, these early returns indicate that September sales were 44 per cent behind last year and about 16 per cent behind August this year.

## Cutler-Hammer Sales Steady

CHICAGO, Oct. 14—Third-quarter shipments of Cutler-Hammer, Inc., totaled $2,198,116, compared with $2,683,398 in the preceding quarter and $3,321,450 in the third quarter in 1929. Nine months' shipments totaled $7,405,721, compared with $9,196,765 in the corresponding period last year.

## The News Trailer

By Herbert Hosking

ASHEVILLE, Oct. 15—Invitation Tour No. 2 of the Highway Education Board roared into town last night aboard five De Luxe coaches. A hundred dust-covered delegates poured into the Grove Park Hotel and that is about all the pouring that was done during the evening.

This is the fourth day of the Eastern tour, invitations for which were extended to delegates attending the Sixth International Road Congress in Washington last week. The party has inspected some of the best roads in Virginia and North Carolina and already it has been necessary to draft a second baggage truck to carry all the filled notebooks. Three members of the party have been seriously afflicted with writer's cramp and two of the interpreters are suffering with international laryngitis.

The party will arrive in Detroit on Sunday, Oct. 25, provided there are no objections from the Tampa (Fla.) Chamber of Commerce.

One of the surprises of the trip to date is the beautiful wavering tenor voice which **Pike Johnson** sprang on the members. **A. H. Kelly**, former assistant export manager of *Hudson*, is strutting his vowels and adjectives as an interpreter. He's just back from France. By the way, **A. W. Childs**, chief of the automotive division, is having a great time with his old boy friends from South America.

This evening **Harvey Firestone** arrived at the hotel and modestly seated himself in a corner while a dance was being contorted.

When the party gets to Detroit there are a lot of questions they are going to ask about the automotive industry. For instance, **A Baalsrud**, director of public roads of Norway, will want to know all about six-wheeled buses. He will be very grateful to anyone who undertakes to tell him all about them. There are a lot of other important highway officials along on this tour. **F. B. Sides**, Hupp's export manager, is busy introducing them. Today we leave for Charlotte, N. C., over some of the most expensive roads in America. Cheerio.

## Pearson Sees Normal Conditions in Offing

### Publisher Decries Use of 1929 Peak as Norm for Measuring Progress Curve

PHILADELPHIA, Oct. 14—A. C. Pearson, chairman, United Business Publishers, New York, in an address last night before the Philadelphia Life Underwriters Association, declared that normal business conditions may be expected soon.

In his analysis of world and domestic trends, he concluded that the combination of low commodity prices, cheap money, great material resources, high living standards and optimism will bring the nation back to pre-peak levels within 6 or 12 months.

"It is necessary to remove the idea that 1929 was a normal year," he said. "It would be more correct to take the average of 1926, 1927 and 1928, which were subsequent to the effects of 1921, and use this average for the norm in computing business recovery.

"A quick recovery probably would be harmful, and at any rate is improbable. We will climb up steadily for another 12 months before we reach normal business.

"But in the meantime, the industrious and efficient managements will win the race. Products must be made as attractive as possible, and sales departments must realize that advertising must be effective to obtain a share of the highly competitive business ahead."

He agreed with Roger Babson that advertising programs should be extended now. "Not only in paid space in publications, but an increase in true, encouraging statements about actual conditions."

He quoted from a recent article in *Automotive Industries*, written by Norman G. Shidle, directing editor, in which the latter wrote that industrial buying in appreciable quantities has begun.

## Standard Oil to Take Telegrams

CHICAGO, Oct. 14—Postal telegraph and cable signs will be placed on 1630 filling stations of the Standard Oil Co. of Indiana beginning Monday. The telegraph company will furnish necessary instructions to attendants.

# New Production Methods Are Born Following Periods of Depression

BRIARCLIFF LODGE, N. Y., Oct. 14—Papers on metallurgical subjects, furnaces, sales economics and foremanship training were read at the fall meeting of the American Drop Forging Institute, which was held here on Oct. 9-11. President C. H. Smith, in his presidential address, referred to the great change in business conditions since the meeting a year ago.

At that time it was impossible to get enough die sinkers to take care of the business in hand, while today conditions were the very opposite. The theory of business cycles, Mr. Smith said, was now being studied by schools of economics. The business cycle was somewhat akin to the ebb and flow of the tides, but whereas the tides could be predicted with mathematical accuracy, there was nothing very precise in predictions of changes in business conditions; in regard to general business about the only sure thing was that it would not remain stable very long. Mr. Smith said there were signs all around us that pointed to changes for the better during the last quarter.

Periods of depression are not without their good side, however, for it is during such periods that most new ideas in production, engineering and marketing originate. At the present time the principal customer of the drop forging industry is the automotive industry, but efforts are being made to find wider markets and new applications of forgings are being found every year.

In this connection Mr. Smith suggested that the Institute engage a research engineer whose duty it would be to study out new fields in which drop forgings could be used to advantage. It is necessary for the industry not only to conserve its present market, but also to develop new ones.

R. C. Hopkins of the Volcanic Specialties Co. presented a paper on "Fuel Oil and Furnaces." Mr. Hopkins dealt with the fundamentals of combustion in furnaces, such as the heat content of fuel oil, efficiency of combustion, amount of heat required to heat a pound of steel to the forging temperature, etc. For the study of combustion efficiency he recommended the use of the Orsat apparatus. "The day has come, gentlemen," said Mr. Hopkins, "where any plant operating hammers should employ a man who can put a little science into the operation of furnaces, instead of mere rule of thumb."

The speaker also pointed out the differences between light and heavy fuel oils and the advantages derived from using the heavier oils, which contain more heat units and cost less per gallon. These heavier oils must be preheated, and it would even pay to preheat them electrically, but in many cases exhaust steam can be used for the purpose.

F. W. McQuaid of the Timken Steel & Tube Company spoke on "Grain Size and Its Relation to Forgings." Grain size in specifications, said Mr. McQuaid, refers to grains of a steel after it has been slowly cooled from a temperature above the critical range (usually about 1700 deg. Fahr.). Coarse grain is indicative of clean and well-made steel, but a fine grain is not conclusive proof that the steel was not properly finished, in fact, the reverse is quite often the case. Mr. McQuaid advised drop forgers that wherever they found grain size specified in orders received by them, they arrive at a clear understanding with both the customer and the steel maker as to the basis for rejection, and as to the chance of losses due to rejected forgings.

Earl Smith of the Republic Steel Corp. spoke on Stainless Steel. From the discussion which followed the talk it was apparent that there is considerable interest in this new material among drop forgers. Asked as to the chances of the price of stainless steel coming down, Mr. Smith said most of the 18-8 alloy (18 per cent chromium and 8 per cent nickel) goes into deep drawings and therefore must have a low carbon content, and the high cost of this material depends largely upon that of the chromium content, as low-carbon ferro chromes are very expensive. Where a low carbon content is not so important and the ordinary ferro chromes can be used, the prices are likely to be reduced; there is plenty of chromium ore, and the crude ore costs only from five to six times as much as iron ore.

President Smith said his firm had found that when drop forgings of stainless steel are to be made it is absolutely necessary to use pyrometer-controlled furnaces.

C. R. Stevenson, of Stevenson, Harrison & Jordan, spoke on the "Economic Effect of Selling at or Below Normal Cost." Mr. Stevenson said that in former years manufacturers generally arrived at their costs from similar work done by them previously, and these might be called historical costs.

At present it is the custom to develop what are called standard or normal costs, that is, the sums which it should cost to produce certain work under standard or normal conditions.

These costs are broken down into material cost, labor cost, overhead, etc.

The manufacturer, upon completing a certain job, then compares his actual cost with the normal cost, not only as a whole but also with respect to each of the items.

A. R. Peirce, Director, Department of Industrial Education, National Metal Trades Association, spoke on "Experience with Foremanship Training in the Metal Industry."

Definite steps were taken at the meeting to organize the various committees that are to work up sections of the proposed handbook on standard drop forging practice. This handbook is to have chapters or sections on Metallurgy, Forging, Dies and Equipment. Asked as to whom this book was intended for, President Smith said he hoped to place it into the hands of every engineering student and of every engineer of every factory that had a smokestack.

He hoped that the issuance of this handbook would help to diversify the products for which the industry would be called upon to supply forgings. An investigation recently made as to the possibility of the use of drop forgings in one particular industry had shown that not 5 per cent of the engineers in that industry even knew what a drop forging was. The Institute had become well known through its cost work and he hoped it would achieve equal success with its handbook.

The next annual meeting of the Institute will be held in Cleveland early in January.

# Reeves Says Motors Will Help Recovery

### Executive Says Used Car Outlook Better

NEW YORK, Oct. 14—The motor industry is an important factor in the return of normal times to general business, according to Alfred Reeves, general manager of the National Automobile Chamber of Commerce, speaking on The Motor Industry's Future before the New York State Automobile Dealers Association in Syracuse today.

The low point in production was reached last month, Mr. Reeves believes, and the industry now appears headed for "Prosperity Highway, especially with the New York automobile show ahead that may be expected to provide a real impetus for our industry and for all business."

Among the encouraging factors Mr. Reeves points out that the used car situation is improving and that through the failure of the poorer grade dealers the position of those who remain is being strengthened. Gearing of production to dealer demands is also building up a situation which should enable a rapid improvement when once this improvement begins.

## South Carolina Gas Tax

COLUMBIA, S. C., Oct. 14—South Carolina's gasoline tax for the month of September amounted to $658,553.88, according to figures just made public by the State Tax Commission. This compares with $659,676.08 for the corresponding month of last year.

## Tells Overseas Club Competition is Keen

### Hodgson Says Vehicles and Parts Exports Hold Up

NEW YORK, Oct. 14—World manufacture of automobiles and parts has now reached a point where American manufacturers may expect much keener competition in the open markets of the world than they have met heretofore, according to James F. Hodgson, commercial attache-at-large of the Department of Commerce, speaking last Thursday before the Overseas Automotive Club at its regular monthly meeting.

European cars are now to quite an extent comparable with American cars in efficiency of operation, quietness, ease and cost. However, American manufacturers still produce goods of such quality that they continue to command the markets of the world on this basis, in Mr. Hodgson's opinion.

Mr. Hodgson quoted statistics showing that while there has been a big decline this year of parts for replacement this decline has been less than that in the export of finished cars and parts for assembly.

It was brought out in the discussion that the month of September, the first during which the new tariff has been in operation, compared very favorably in foreign trade with months prior to it, allowance being made for general business conditions.

## Soviet Engages in Bearing Industry

MOSCOW *(by mail)*—In the latter part of August the foundation was laid for a state factory for the manufacture of ball and roller bearings. Mr. Tolokonzev, head of the United Machine Building Industry, stated that it has concluded an agreement with the Italian company Villard-Perozo for technical assistance in the construction of the factory and that this firm has sent to Moscow a group of specialists, headed by the director of the company, Mr. De Vendetti, who helped to solve a number of questions in connection with its construction. The agreement also provides for the apprenticeship of a large number of Soviet workers and technicians in its ball and roller bearing factory in Italy.

## Fordson Price Reduced

DETROIT, Oct. 12—Edsel B. Ford, president of the Ford Motor Co., has authorized the following statement:

"Effective Saturday, Oct. 11, the price of the Fordson tractor will be reduced from $750 to $675. This reduction is being made to bring the price of the Fordson in line with the prices of other Ford products. Within the last few months we have reduced the price of Ford cars and trucks and Ford airplanes."

## Seattle Ford Plant To Employ 1000

SEATTLE, Oct. 14—Within the next 30 days 1000 men will start to work on the erection of the Ford Motor Co. $3,000,000 assembly plant and warehouse here. This announcement was made last week by Ford officials who said that the new plant on a thirty-acre site will double the output of the Seattle Ford branch and provide employment for more than 1600 men when working at capacity.

## U. S. Rubber to Buy Samson Tire Concern

NEW YORK, Oct. 14—United States Rubber Co. at its October meeting of the board of directors, authorized the acquisition of a controlling interest in the Samson Tire & Rubber Corp. of Los Angeles through a new corporation presently to be formed. The plan calls for exchange by present shareholders of Samson company of their present holdings of common stock for preferred stock in the new company.

## N.S.P.A. Submits Export Code

DETROIT, Oct. 14—A code of ethics establishing a standard of export practices is being submitted to all export houses and combination export managers on the accredited list of the N.S.P.A. Those individuals and firms signifying their approval of the code and willingness to adhere to it will continue to be carried on the accredited list of the committee.

## Graham Sales Up

DETROIT, Oct. 12—Officials of Graham-Paige Motors Corp. point out gradual business recovery is further indicated by Graham September registrations in Cook County, Ill., which show an increase of 74½ per cent over August. Usually August registrations are higher than those of September.

## Receiver to Sell New Way

DETROIT, Oct. 12—Petition of the receiver to sell the land, buildings, stock and equipment of the New Way Motor Co., Lansing, has been granted by Ingham county court to J. W. Wilford, who was named receiver for the company some time ago.

## Imperial Production Up

DETROIT, Oct. 18—Production schedules of Chrysler Imperial Eights have been increased 100 per cent over the original estimate. Unfilled orders on these models now total 208 per cent over the original production schedule.

## Mexico Imports Maintain Volume

### Used Car Demand Over Border Shows Decrease

LAREDO, TEX., Oct. 14—Of the 493 carloads of American goods and commodities which were exported to Mexico through the Laredo port of entry during the month of September, automobiles led the list with a total of 86 carloads, containing 516 automobiles. Exportation of cars of American manufacture into that country through other border gateways and deep-water ports totaled approximately 1000, it was estimated by customs officials here.

One of the features of the automobile trade in Mexico was the decrease of the demand for used cars. Dealers report that their orders for new cars show more than the normal seasonable increase. Besides the rail shipments of both new and used cars into Mexico during last month, many motor vehicles were purchased in the United States and driven into that country.

Now that a modern highway has been completed to Monterey from Laredo, many individual buyers drive their own cars from this side of the border to their homes.

During September, a total of 14 carloads of automobile parts and 17 carloads of lubricants were exported to Mexico through Laredo.

## Plymouth Plans Radio Programs

DETROIT, Oct. 12—The first of a series of 13 weekly radio programs, each presenting a tour of a foreign country, sponsored by the Plymouth Motor Corp., will be broadcast Oct. 27. The campaign will be known as the Plymouth World Tour. Spot broadcasting will be used from 88 stations throughout the country. The programs will include addresses by leading statesmen and other prominent figures abroad, symphonies and military band music and native songs and dances. Vincent Sheean will be the announcer and the "guide." A staff of technicians and continuity experts have spent the past several months preparing the programs, which will be presented by electrical transcription.

## Detroit Aircraft Gains

DETROIT, Oct. 15—Detroit Aircraft Corp. reports new business booked from Sept. 10 to 20 as the best for any similar period in the history of the company. Gross sales amounted to $91,705, which is 18 per cent ahead of any other ten-day period except when Government contracts have been obtained, according to Karl S. Betts, sales manager. The report lists the sale of 11 ships, including five Lockheeds.

## Mack Announces AK Heavy Truck

### Six-Cylinder Engine Now in AK Model

NEW YORK, Oct. 14—A six-cylinder Model AK truck has been added to the line of the Mack Trucks, Inc. It is designed for heavy duty in services where higher speed and greater power are desirable than given by the older line of trucks, and it does not replace the four-cylinder AK. It retains the familiar Mack "bulldog type" hood and is offered with either a covered or coupe-type cab.

The new truck has a six-cylinder engine of Mack design and manufacture, of 4½-in. bore and 5½-in. stroke, developing 126 hp. at 2200 r.p.m. Pistons are of aluminum alloy and of the invar-strut type, connecting rods are tubular, and the cylinders are cast in a single block.

The crankshaft has case-hardened journals and is provided with integral counterweights and with a torsional vibration damper. Valves are flat-seated and located on the right-hand side, the cylinders being of the L-head type. Lubrication is by combined force-feed and splash as in other Mack engines, and oil is cleaned in an H.W. filtrator.

The clutch is a single-plate dry type and the transmission affords four forward speeds and one reverse. A double-reduction rear axle is fitted, of the full-floating type. Other mechanical features are in accordance with the usual Mack practice.

Three different wheelbases are offered: 174, 186 and 198 in. Pneumatic tires, 36 by 8 in., duals in the rear, are standard equipment, these being mounted on spoked steel wheels.

## National Carbon is in Lubrication Field

CLEVELAND, Oct. 14—On Nov. 1 the entire line of "Gredag" lubricants, manufactured by the Acheson Graphite Corp., a unit of the Union Carbide & Carbon Corp., will be distributed by the Carbon Sales Division of National Carbon Co., Inc.

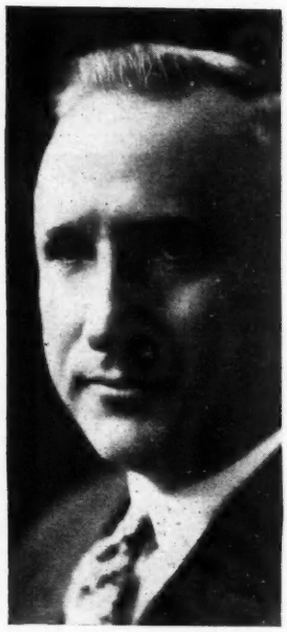
### Announces De Luxe Delivery

DETROIT, Oct. 17—The Ford Motor Co. has just introduced a de luxe delivery car mounted on the Model A chassis. The car closely follows the lines of the Tudor Sedan.

### Austin Increases Coupe Price

BUTLER, PA., Oct. 15—Effective today, the price of bantam Austin coupes will be advanced $20. The list price will be increased from $445 to $465 f.o.b. the factory here.

## Reuter Heads Oakland, Glancy Joins Detroit Staff of G. M. C.



*I. J. Reuter, left, who is the new general manager of Oakland, succeeds A. R. Glancy, right, who will serve on G. M. general staff.*

NEW YORK, Oct. 15—Irving J. Reuter, vice-president of General Motors and managing director of Adam Opel A. G., Russelsheim, Germany, has been appointed general manager of the Oakland Motor Car Division, General Motors Corp., succeeding A. R. Glancy, who has been transferred to the general staff of the corporation in Detroit, according to announcement made by Alfred P. Sloan, Jr., president.

Under Mr. Glancy's administration, the Oakland division has progressed from a production in 1925 of less than 50,000 to over 200,000 in 1929. The Pontiac was added to the line in 1927, a new plant has been built and organized and a new division of Fisher Body Corp. erected adjacent to this plant.

Evidently in an attempt to set at rest rumors about discontinuance of either the Oakland or Pontiac lines, Mr. Sloan adds to his announcement the statement that it is the intention of the corporation to continue the present Pontiac and Oakland cars substantially as they now exist, injecting into their design and manufacture such improvements as may be possible from time to time.

### Eddins May Succeed Reuter

LANSING, Oct. 16—Irving J. Reuter's successor has not been announced, but it is assumed that D. S. Eddins, vice-president, who, since last November, has been general manager of Olds, will be advanced to presidency. Mr. Reuter became head of Olds in February, 1925.

## General Tire Plans Increased Output

AKRON, Oct. 15—Production operations of the General Tire & Rubber Co. will continue at the same rate as at present during November and December and will be increased in January, it is announced by W. O'Neil, president of the company.

## Lamont is Promoted

DETROIT, Oct. 12—Major T. Lamont, formerly used car manager of the Reo Michigan Sales, Inc., Lansing, Mich., since Jan., 1929, has been appointed general sales manager of the company, to succeed Roy Woods who resigned about a month ago. Prior to his connection with Reo Mr. Lamont was with Capital Auto Co., local Dodge dealers.

### Biflex Plant is Busy

DECATUR, ILL., Oct. 18—The Decatur plant of the Biflex Products Co. is operating at capacity with force of 300 as result of the transfer of a huge order for automobile metal tire covers to the plant and the placement of another large order for bumpers by the Houdaille-Hershey Corp., parent organization of Biflex.

### American Forging Declares

PONTIAC, MICH., Oct. 14—Directors of the American Forging & Socket Co. have declared the regular quarterly dividend of fifteen cents per share on it's no par shares.

## Bridgeman Lists 8 Gas Qualities

### S.A.E. Hears Authority at Section Gathering

PHILADELPHIA, Oct. 16—Dr. O. C. Bridgeman of the Bureau of Standards, was the speaker last night at the monthly meeting of the Philadelphia Section of the S.A.E., on "Fuels for 1931." He listed eight qualities that chiefly determine the value of motor fuels and said that two other characteristics on which most emphasis is placed, as a rule, the power obtainable from a given engine with the fuel in question, and the mileage obtainable from a gallon of the fuel with a given vehicle, are really of minor importance as indices of quality, for the reason that all of the motor fuels marketed are equal to each other in these respects within very narrow limits. An extended discussion followed the talk.

Chairman Neil announced that an invitation had been extended to all members of the Philadelphia S.A.E. Section to attend a lecture on Aeronautical Meteorology by W. R. Gregg, to be given at the Engineers Club on Oct. 21. He also announced that under the new arrangement whereby members of the S.A.E. pay their regular membership dues and section dues together, it had been decided that if any member located outside the territory allocated to the Philadelphia Section wished to join that Section, he need only let it be known.

## Cadillac September Registrations 3496

DETROIT, Oct. 13—Lawrence P. Fisher, president, Cadillac Motor Car Co., announced yesterday that September production of Cadillac cars was slightly less than August production, which was Cadillac's biggest month for all 1930. August production was 3535 cars and September, 3496.

In addition, actual orders on hand for deliveries to foreign countries will make October by far the biggest month this year for Cadillac export business, it was said.

"The fact that Cadillac has experienced its two biggest months of the year during August and September," stated Mr. Fisher, "can be attributed to two reasons: first, the introduction during the first part of September of the new LaSalle V-8 and Cadillac V-8 and, second, increased buying on the part of the public.

## Importer Plans Visit

NEW YORK, Oct. 14—Will L. Smith, president of Will L. Smith, Inc., Buenos Aires, Argentina, exclusive representative in Argentina and Uruguay of Thompson Products, Inc., The Piston Ring Co., Republic Gear Co., Trico Products Corp., Emsco Asbestos Co. and other American manufacturers of automotive replacement parts, is planning to arrive in New York on a business trip October 28. While here he will make his headquarters at the New York office of the company and will endeavor to line up some new accounts.

## Buses Use Fluid Flywheel And Self-Changing Gears

LONDON, Oct. 6 *(by mail)*—It is announced today that the London General Omnibus Company will shortly put in service experimentally three buses with the new Daimler transmission system, consisting of the "fluid flywheel" and four-speed self-changing gearset standardized recently for three new Daimler passenger cars.

## Goodrich Listing Approved

NEW YORK, Oct. 14—B. F. Goodrich Co. has secured listing of $30,000,000, principal amount of 15-year, six per cent, convertible gold debentures on the New York Stock Exchange. These debentures are dated June 1, 1930, and are due June 1, 1945.

Proceeds of the sale of these bonds are to be used in the liquidation of current indebtedness, a substantial amount of which were incurred in connection with the acquisition of assets and businesses of Hood Rubber Co. and the Miller Rubber Co.

## Motor Products Reports

DETROIT, Oct. 15—Motor Products Corp. has reported net profit for quarter ended Sept. 30 of $15,054 after charges and Federal taxes equal to eight cents a share earned on 197,366 no par shares of capital stock.

DETROIT, Oct. 15—George Kohlenberger, formerly of Oakland, Calif., branch of United Motors Service, has been appointed manager of Radio Sales and Service, according to announcement by W. N. Potter, director of sales.

## Gramm Adds 3-Ton Six-Cylinder Truck

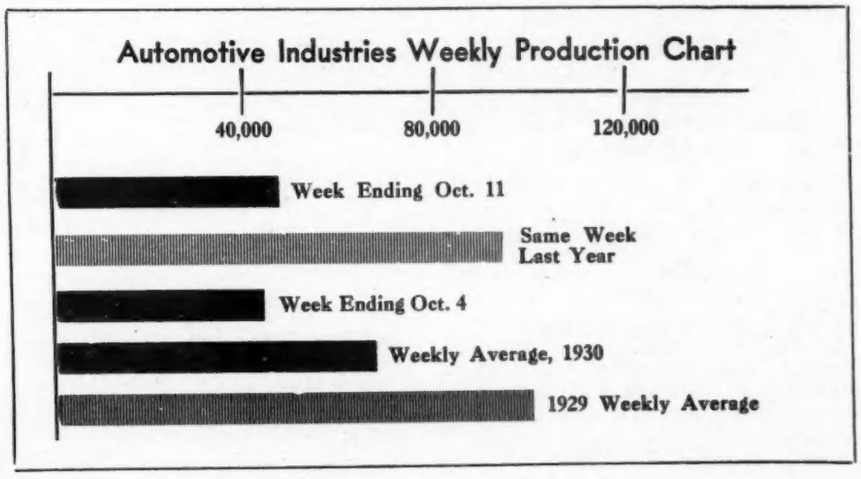
### Engine Develops 41 hp. at 2200 r.p.m., Maker Says

DELPHOS, OHIO, Oct. 14—Gramm Motors, Inc., has added a new 3-ton model, known as Series E, which is powered by a six-cylinder engine of 3⅞ in. bore and 5 in. stroke. The standard chassis has a wheelbase of 160 in., but an option is given on a wheelbase of 175 in. A straight rating of 20,000 lb. is applied to the vehicle. With an engine speed of 2200 r.p.m. and a rear-axle ratio of 5.57 to 1 the truck develops a maximum speed of 41 m.p.h. A number of optional rear axle ratios are offered. A four-speed transmission is built in unit with the engine. The rear axle is of the full-floating spiral-bevel type with single reduction gearing, the pinion being straddle-mounted. All shafts and gears are of alloy steel, heat-treated. A double-reduction full-floating axle can be supplied optionally at extra price, the reduction ratios available with this axle being 5.9, 6.41, 7, 7.83 and 8.44.

Four-wheel hydraulic service brakes are fitted and are operated by a B-K vacuum booster. A Tru-Stop disk brake is mounted on the propeller shaft. Wheel equipment consists of cast metal spoked-type wheels with 20 by 7-in. rims, duals in the rear. Budd disk wheels can be supplied at slight extra cost. The regular price on this truck chassis is $2,595.

## Waukesha Nets $450,579

CHICAGO, Oct. 14—Waukesha Motor Co. reports for the year ended July 31, net profit of $450,579, after charges and Federal taxes, equivalent to $4.50 a share on 100,000 shares of no par capital stock, compared with $1,801,952 or $18.02 a share in the previous fiscal year. The company's balance sheet as of July 21, shows current assets of $3,245,651 and current liabilities of $708,058, compared with $4,118,200 and $1,358,623 respectively as of July 31, 1929.



## A.E.C. is Producing Oil Engined Chassis

### Speed Ranges From 300 to 3000 Revolutions

LONDON (*by mail*)—The Associated Equipment Co., subsidiary of the London General Omnibus Co., after extensive endurance tests of oil engines built by it, utilizing the Bosch Acro system, has produced the first batch of 100 vehicles with this type of powerplant. The experimental chassis have a load capacity of 6½ tons and a speed of over 40 m.p.h.

The chassis now put into production are primarily for truck service; before they could be used for bus service in London the approval of the Metropolitan licensing authorities must be obtained.

A compression ratio of 15.5 to 1 is employed. Electrically-heated plugs are utilized for cold starting, for which also an electric motor is used. The A.E.C. rendering is said to have a speed range from 300 to 3000 r.p.m., the maximum power being obtained at about 2500 r.p.m.

## Goodrich Sales Increase

AKRON, Oct. 14—B. F. Goodrich Co. reports that tire sales for September this year were substantially above such sales for September, 1929. While seasonal fluctuations resulted in some shrinkage in sales in September of this year as compared with August, this shrinkage was not so marked as in corresponding periods in 1929.

## Austin, Ltd., Reports Profit

LONDON, Oct. 14—Austin Motor Co., Ltd., for the seven months ended July reports net profit of £384,342 after maintenance, depreciation, interest, income taxes, sinking fund reserves, etc. Capital stock consists of 250,000 7 per cent cumulative preference shares of £1 each, 1,000,000 6 per cent (tax free) cumulative B preference shares of £1 each, 1,500,000 20 per cent preferred ordinary shares of 10s each and 600,000 ordinary shares of 5s each.

## Sees Tire Price Stabilizing

TORONTO, Oct. 14—C. H. Carlisle, president and general manager of the Goodyear Tire & Rubber Co., of Canada, Ltd., says the present level of tire prices would be maintained for the next five years unless there were unforeseen circumstances to make drastic changes in production conditions. While rubber is going down cotton fabric prices have been going up and cotton, being used to a greater extent than rubber, has a greater influence upon the price of the tire.

## + + CALENDAR + + OF COMING EVENTS

**SHOWS**

London, England, Olympia Show..October
Dallas, Southwestern Automobile, Oct. 11-26
National Roadbuilders' Show and Convention, St. Louis .....Jan. 10-16
International Garage Exposition, Berlin, Germany .....May 9-Aug. 9
New York, National Automobile..Jan. 3-10
Chicago, National Automobile...Jan. 24-31

**CONVENTIONS**

Society of Automotive Engineers, Transportation, Pittsburgh..Oct. 22-24
Motor and Equipment Association, Convention, Cleveland .....Nov. 13-19
N. S. P. A. Convention, Cleveland, Ohio, Nov. 13-19
Annual Asphalt Paving Conference, Memphis, Tenn. .....Dec. 1-5
First International Aerial Safety Congress, Paris, France .....Dec. 10-23
Society of Automotive Engineers, Annual Dinner, New York .....Jan. 8
Society of Automotive Engineers, Annual Meeting, Detroit....Jan. 19-23
Society for Steel Treating (National Western Metal and Machinery Exposition), San Francisco..Feb. 16-20

**SALONS**

Chicago, Drake Hotel .....Nov. 8-15
New York, Commodore Hotel, Nov. 30-Dec. 6
Prague, Czechoslovakia .....October
Paris, France, Salon (Commercial Vehicles) .....Nov. 13-23
Brussels, Belgium, Salon.....Dec. 6-17

## Soviet to Grow Rubber

MOSCOW (*by mail*)—The newly organized Soviet trust for the development of rubber plantations has already begun work in the Kuyuk Mountains in Kazakstan. It is planned to plant more than twenty million rubber-bearing plants of the tausaghi variety in that section. The yield this year is expected to be more than 200 tons and that for next year (1930-31), 2500 tons.

In order to facilitate work on the rubber plantations the workers of the Leningrad and Moscow rubber factories have organized brigades which were to leave for Kazakstan early in September for the purpose of collecting tausaghi seeds. A new experimental factory for the extraction of rubber from rubber plants is being erected in the Kara-Tau Mountains, which it is expected to complete by Oct. 15. It is also planned to establish two technical colleges for the study of rubber, in Moscow and in Kiev, and also two institutes in Kiev and in Alma-Ata (Kazakstan).

## Austin to Build Ex-Cell-O Plant

DETROIT, Oct. 14—The Ex-Cell-O Aircraft & Tool Corp. has awarded the contract for the design and construction of a new unit for the Continental Tool Division in Detroit to the Austin Co.

## Imperial Oil Will Merchandise Tires

### Canadian Concern Plans Extensive Merchandising

TORONTO, ONT., Oct. 14—C. O. Stillman, president of the Imperial Oil, Ltd., announces that stocks of tires and tubes will be established in Ontario service stations of the company during the month of October and as quickly as possible will be made available to garages, dealers and service stations elsewhere throughout the Dominion. It is intended by the spring of 1931 Atlas tires and tubes will be on sale in practically every city, town and hamlet in Canada. Atlas tires and tubes will be manufactured in Canada and will be backed by a liberal one-year guarantee for passenger cars and six months if used for trucks.

## Ohio Sales Off

COLUMBUS, OHIO, Oct. 14—The Ohio Council, National Automobile Dealers Association in a bulletin covering sales of passenger cars in nine of the most populous counties in Ohio shows that September sales were 5450, as compared with 6858 sales in August of this year in the same counties. The decline is slightly more than 20 per cent.

September sales in Cuyahoga County (Cleveland) were 2081, compared with 2594 in August; September sales in Hamilton County (Cincinnati) were 1005, compared with 223 in August; September sales in Summit County (Akron) were 415, compared with 579 in August; September sales in Lucas County (Toledo) were 347, compared with 525 in August; September sales in Franklin County (Columbus) were 610, compared with 669 in August; September sales in Mahoning County (Youngstown) were 273, compared with 402 in August; September sales in Stark County (Canton) were 262, compared with 351 in August; September sales in Montgomery County (Dayton) were 387, compared with 435 in August, and September sales in Scioto County (Portsmouth) were 70, compared with 80 in August.

Ford still leads with 1904 sales while Chevrolet was second with 945; Buick third with 363, and Plymouth fourth with 197.

## Dodge Sells Sea Taxis

NEW YORK, Oct. 13—Horace E. Dodge Boat & Plane Corp. has sold several of its 16-ft. 40-hp. standard runabout motorboats for marine taxicab service. These boats are used in carrying passengers on days when not enough passengers appear to fill the 25-ft. boats normally used for this service.